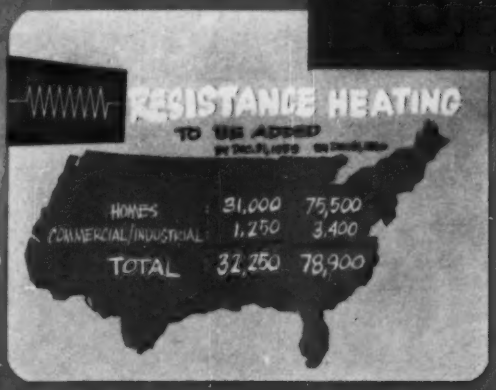
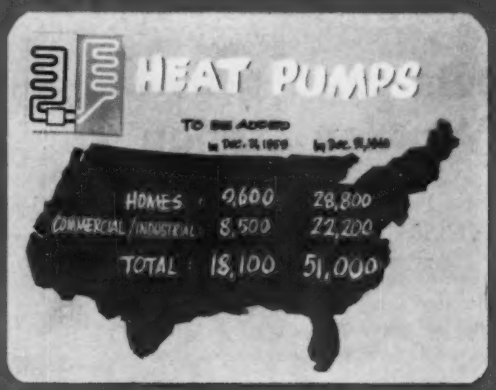
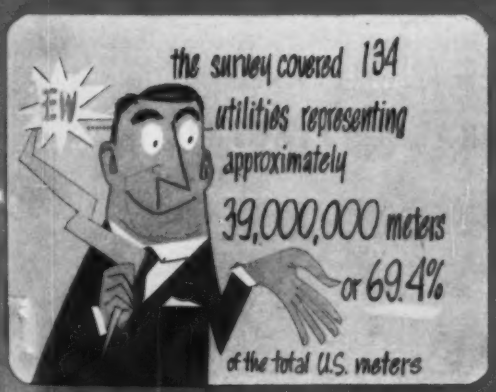
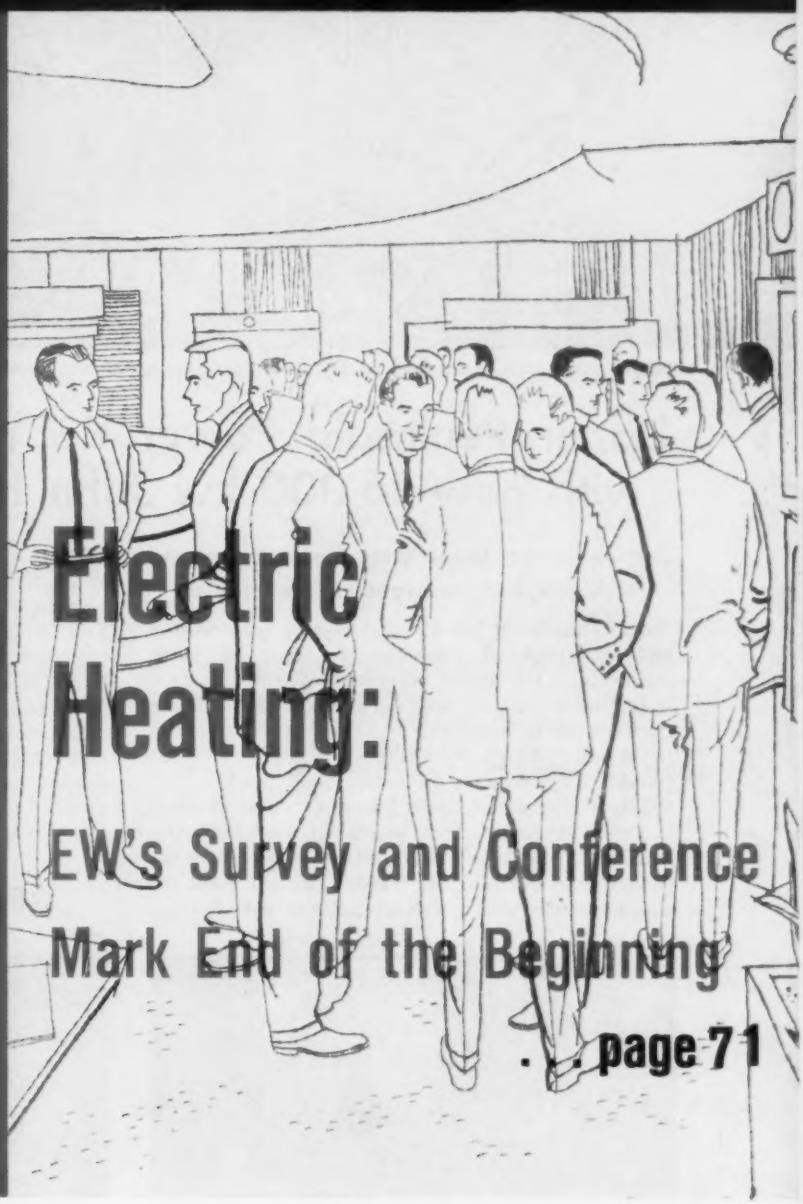
Electrical World









Electric Heating:

EW's Survey and Conference Mark End of the Beginning

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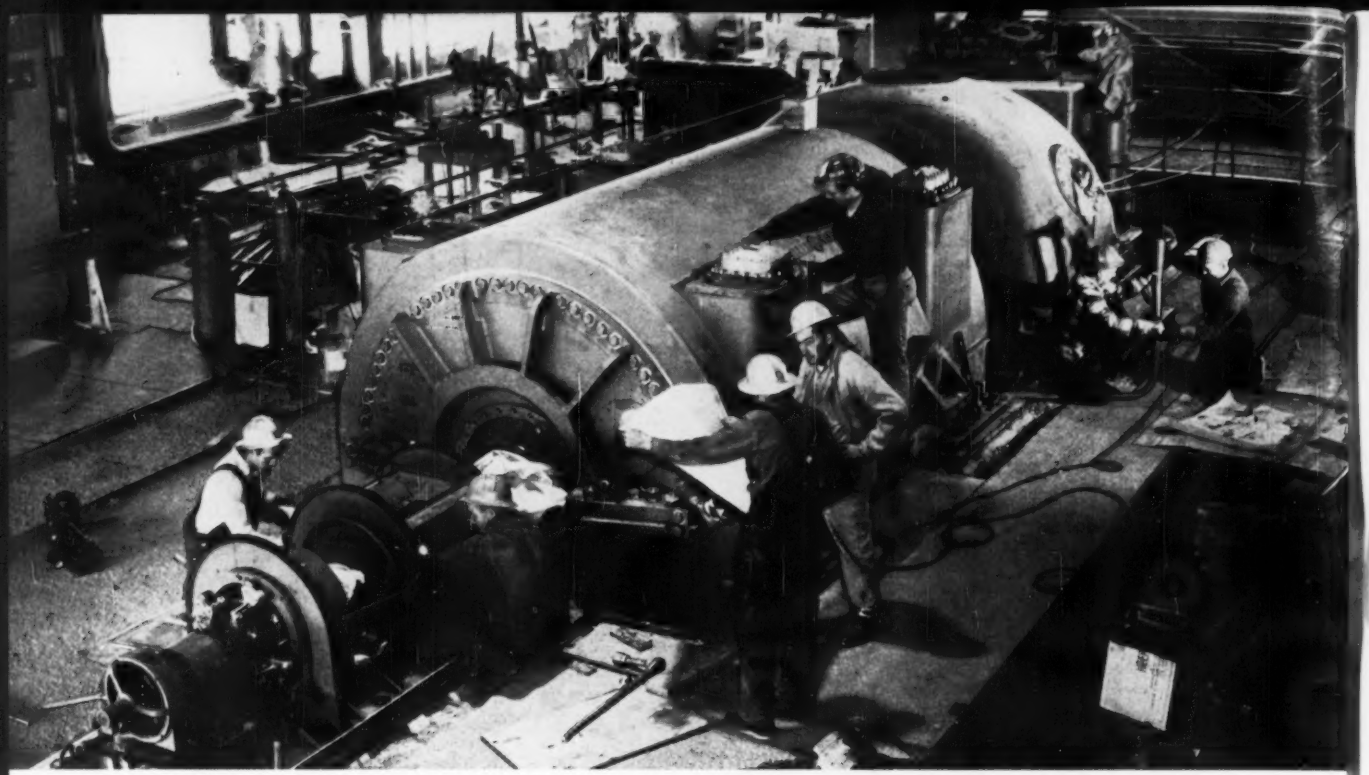

INSTALLATION of 16,000-kw G-E steam turbine-generator and associated electrical apparatus was supervised by experienced G-E Project Engineer.

Upper Peninsula Power Co. meets area growth with new 16,000-kw John H. Warden Station

G-E engineers team with Stone & Webster Michigan, Inc., to expedite final start-up

Latest chapter in the forward-looking construction and modernization program of Upper Peninsula Power Co. is the 16,000-kw John H. Warden Station at L'Anse, Michigan. Designed to help satisfy existing power needs of industrial and residential customers in the utility's service area, this new station will also provide surplus power for anticipated growth.

When Upper Peninsula Power Co. and Stone & Webster Michigan, Inc., selected General Electric turbine-generator and major auxiliary apparatus exclusively for the John H. Warden Station, their decision brought with it full advantages of G-E engineering teamwork. From preliminary design stages through final start-up, G-E engineers assisted in keeping costs down and in meeting project schedules. During the course of the project, General Electric engineers coordinated design, manufacture and delivery of the turbine-generator and all major electrical apparatus, and provided technical supervision of installation of this equipment at the site. This coordination and cooperation between the two organizations were important factors in the completion of this project on schedule and at a favorable cost.

301-407

MORE POWER TO AMERICA

GENERAL ELECTRIC

THOROUGH PLANNING simplified project construction. Stone & Webster's H. B. Follum, A. J. Seaburg, H. N. McCampbell, R. S. Hopping; G.E.'s L. E. Crane check station plans.

UTILITY serves 11 counties in Upper Peninsula. Above: Mr. J. H. Warden, President, Upper Peninsula Power; G. A. Pillmore, G.E.; W. Veeser, Upper Peninsula Power; C. M. Chumbley, G.E

Electrical World

Vol. 152, No. 20 NOVEMBER 16, 1959

Published for 85 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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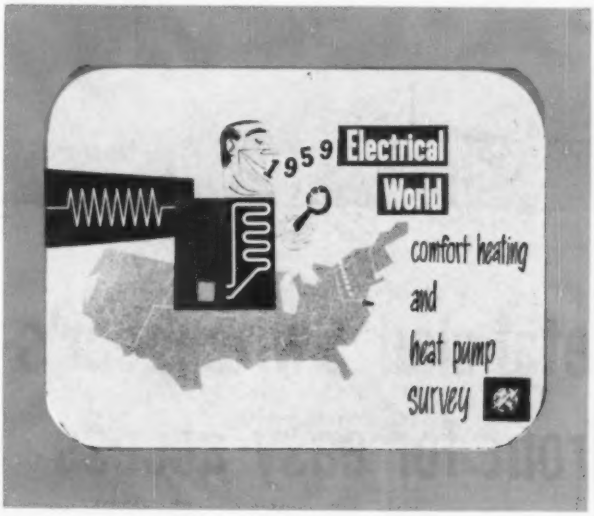

Electric Heating–End of the Beginning

A 12-page wrap-up of Electrical World's fourth Electric Comfort Heating and Heat Pump Conference and results of the latest heating survey indicate the progress utilities are making in developing the most promising market on the horizon today.

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You'll find out . . .

Vertical Lift Metal-clad Switchgear's mechanism is up front for easy access

Change places for a moment with the man who maintains your metal-clad switchgear. You'll probably discover you prefer—as he does—to work with General Electric Vertical Lift Metal-clad.

One big reason . . . Vertical Lift is the only metal-clad which has the breaker operating mechanism right up front where it's easy to get at. Unlike designs which locate the mechanism under the contacts, the G-E mechanism can be exposed for inspection in less than a minute. Vertical Lift saves your maintenance crews time, saves your company money. General Electric Company, Schenectady 5, New York. 511-35

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LETTERS

Cost of Common Stock Money

To the Editor:

I was considerably disturbed by certain comments that appeared in the Management Newsletter in your September 28th issue in which you discussed the question, "Can Utilities Cut Financing Costs?"

On page 146 you state that "common stock money (is) costing not far from a 30-year low" and "as long as utility common stock money is so cheap, 5.7% in mid-September . . ." these statements indicate a complete lack of understanding as to what constitutes the cost of common stock money, in that they infer that this cost is measured by the ratio of latest reported earnings to current market price—that is, by current earnings-price ratios.

It should be reasonably apparent, however, that when investors buy common stocks, they are not buying the latest reported earnings, but rather a sequence of future earnings. It is expected future earnings that induce the investment and it is the ratio of these expected earnings to the price paid for the stock that constitutes the cost of common stock money.

Under conditions of business expansion, common stocks are bought with the expectation that future earnings will be higher than those currently being shown. This is particularly true in periods of stock market optimism, when current earnings-price ratios are low, such as the 5.74% figure you mentioned for mid-September. This figure substantially understates the cost of common stock money and it is completely wrong to infer that it represents such cost.

Charles Tatham
Manager, Public Utilities Dept
Bache & Co
36 Wall St.
New York 5, N. Y.

The 5.74% figure referred to in your letter is the earnings-price ratio which is near a 30-year low. It does not, however, represent the true cost of common stock money, which has been placed by some analysts at 10% or more.

COMING NEXT WEEK . . . An intriguing approach to the economic evaluation of engineering proposals . . . An oil refinery distribution system that is designed for high reliability under severe weather conditions . . . this article contains some economy tips sure to spark ideas . . . A northwest utility shows keen appreciation for developing the recreational resources in its area . . . And, of course, all the regular features designed to keep you up-to-date on the latest industry news.

The Importance of Balanced Compounding in Portable Cable Design

A portable cable is constantly under attack from many different directions. It is dragged over rough floor surfaces and rocky terrain, crushed under the wheels of trucks and carts, continually bent, flexed and stretched. In addition, it is very often subjected to attack by water, solvents, oil and ozone.

To give long, dependable service, portable cables must be able to withstand rough treatment, and must have built-in protection against all deteriorating factors. Moreover, they must possess other desirable qualities such as lightness and flexibility.

The science in designing these cables is to add the necessary ingredients in the jacket to provide maximum protection along with the maximum of other desirable features. This is where *Balanced Compounding* comes in. It is very easy to provide protection against one or two of the deteriorating factors, simply by loading the compound with an ingredient which is impervious or highly resistant to these factors. Unfortunately, however, the ingredients which provide resistance to abrasion or crushing may be highly susceptible to attack by oil or water; and vice versa.

The cable designer's problem, then, is to attain a balance in his compounding formula which will provide maximum protection against one deteriorating factor without reducing protection against others below the danger point.

To the buyer of cables, this means that *quantity* of any one ingredient is unimportant, unless it is considered in relation to the over-all ability of the cable jacket to resist *all* of the abuses to which it is subjected.

For balanced resistance to all these abuses, the best assurance you can get lies in the quality of the research and development facilities of the manufacturer, and the product's record of performance.

This is one reason why — in those industries where portable cables are continually used or purchased as components of a manufactured product — Simplex Tirex Cables are regarded as the standard.

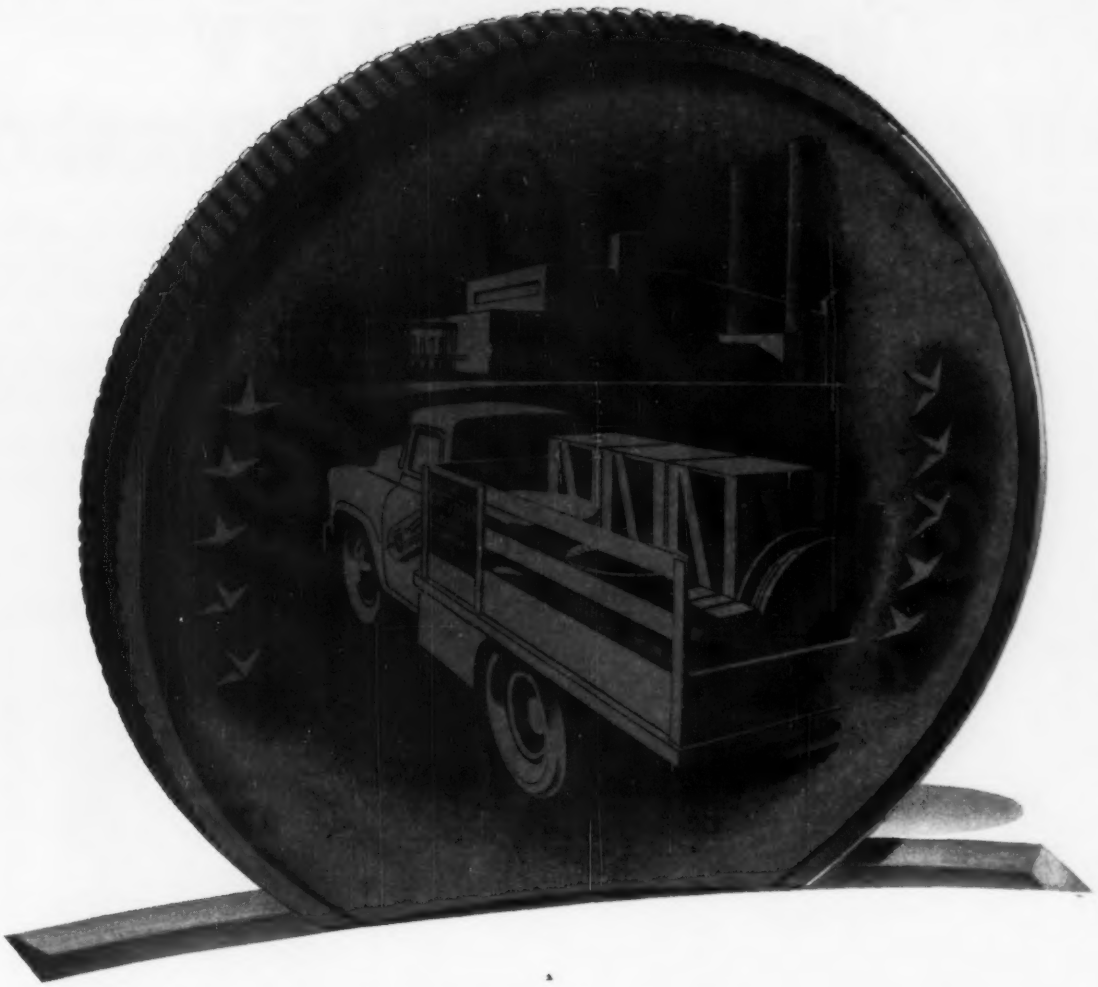
Proof of the worth of Tirex *Balanced Compounding*, which gives balanced resistance to all the deteriorating factors of normal use, can be found in the fact that Tirex cables have been successfully performing under the most rugged operating conditions for periods ranging up to twenty years.

BALANCED COMPOUNDING CURED IN LEAD

Simplex

WIRE & CABLE COMPANY

Cambridge, Massachusetts and Newington, New Hampshire



You can save money on delivery time... with Graybar as your auxiliary warehouse

Multiple orders require separate handling, shipping and billing. Plus follow-up, individually and often. There's a good chance you can save a great deal of time just by ordering from your nearby Graybar warehouse. It's that simple.

Moreover, you avoid uncertainty. For delivery to your central warehouse or sub-store is by truck, directly under your control or ours.

Start with a local call . . . Phone in your bill of materials. We'll have it assembled for loading by the time your pickup arrives. Or a Graybar truck will highball it out to you.

Employee-owned Graybar, a part of your local community, has served utilities continuously since the first lines went up. Whether you require 3 items or 3,000 you'll find Graybar your nearest source for most of what you need.

Start things rolling. Call your Graybar man.

When Graybar is your auxiliary warehouse –	You save on storeroom costs Reduce inventory investment Insure prompt delivery Step up man-hour efficiency Simplify bookkeeping

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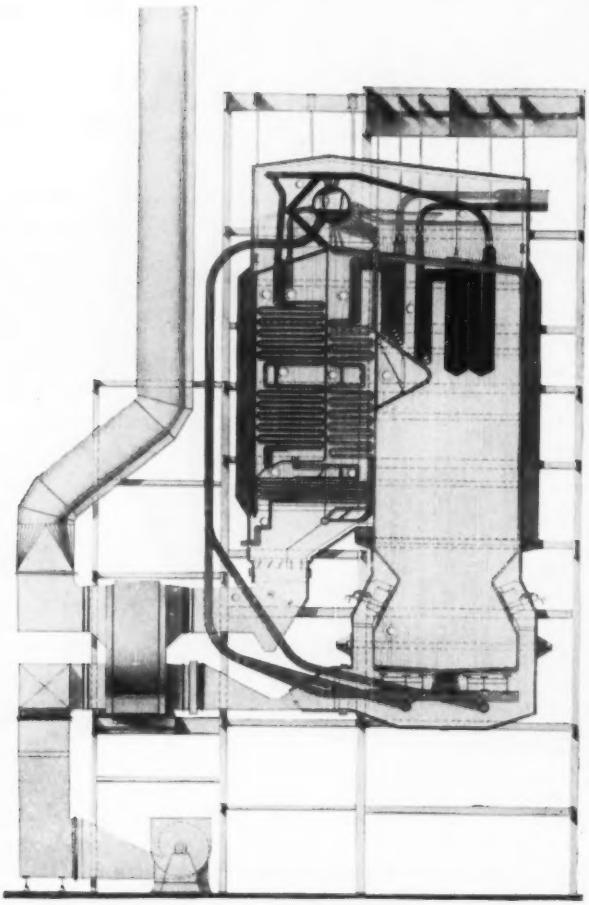
GRAYBAR Everything Electrical GraybaR ELECTRIC COMPANY

IN OVER 130 PRINCIPAL CITIES

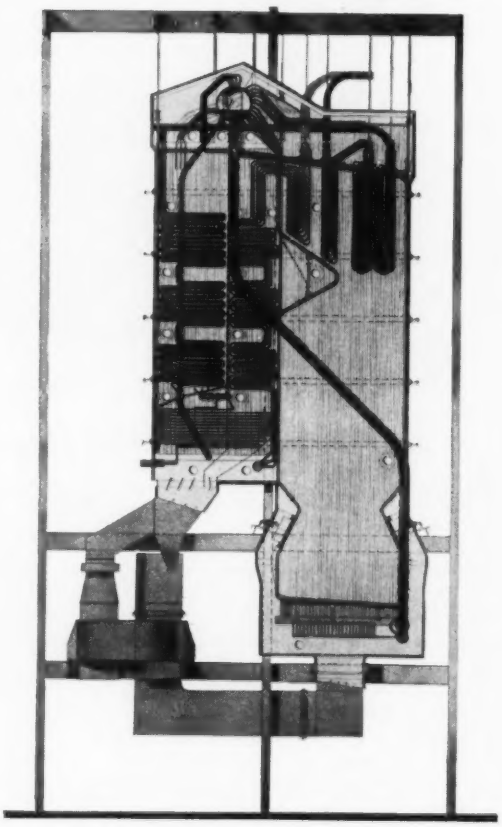
LOCAL SERVICE TO UTILITIES THROUGH COAST-TO-COAST WAREHOUSING

How The RILEY TURBO FURNACE



Texas Public Utility — 1,200,000 lbs/hr
1005/1005F; 2125 psig — Gas or Oil Fired

- Permits the use at any time of the most economical fuel available — a wide range of coals, lignite, fluid coke, natural gas, blast furnace gas, oil.
- Complete burn out of all combustible material virtually eliminates combustible loss.
- Nearly equal furnace performance with oil, gas or coal firing simplifies steam temperature control.



Florida Public Utility — 600,000 lbs/hr
1005/1005F; 1650 psig — Gas and Oil Fired

A FEW TURBO FURNACE CENTRAL STATION BOILERS INSTALLED AND UNDER CONSTRUCTION

*Delaware City Power Station
Delaware Power & Light Company
Delaware City, Delaware
Units No. 1, 2, 3

*Permian Basin Steam Electric Station
Texas Electric Service Company
Monahans, Texas

*Sterlington Steam Electric Station
Louisiana Power & Light Company
Sterlington, Louisiana

Rockwell Station, Unit No. 6
Manila Electric Company
Manila, Philippine Islands

*North Lake Steam Electric Station
Dallas Power & Light Company
Dallas, Texas
Two (2) Boilers

*Turner Unit No. 4
Florida Power Corporation
Enterprise, Florida

*Little Gypsy Steam Electric Station
Louisiana Power & Light Company
Little Gypsy, Louisiana

Agua Fria Station, Unit No. 3
Salt River Power District
Phoenix, Arizona

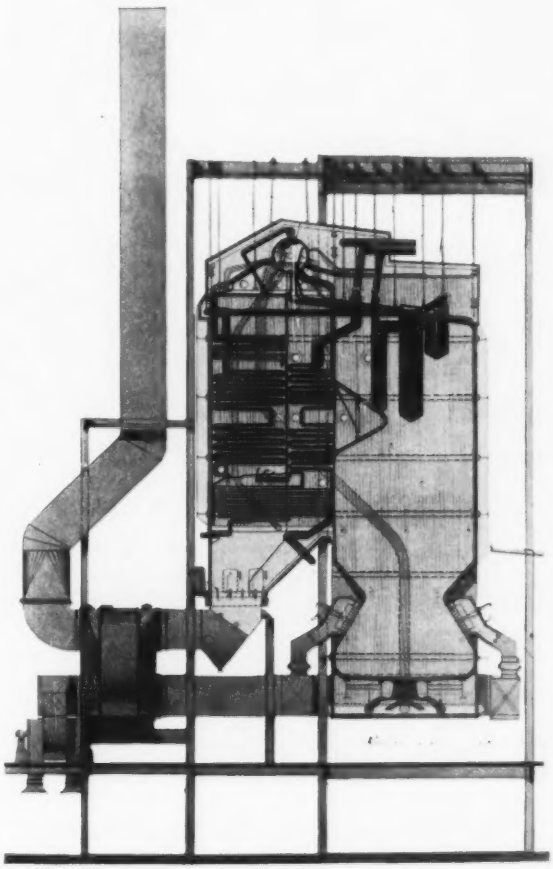
Michoud Steam Electric Station
Unit No. 2
New Orleans Public Service, Inc.
New Orleans, Louisiana

*Installed

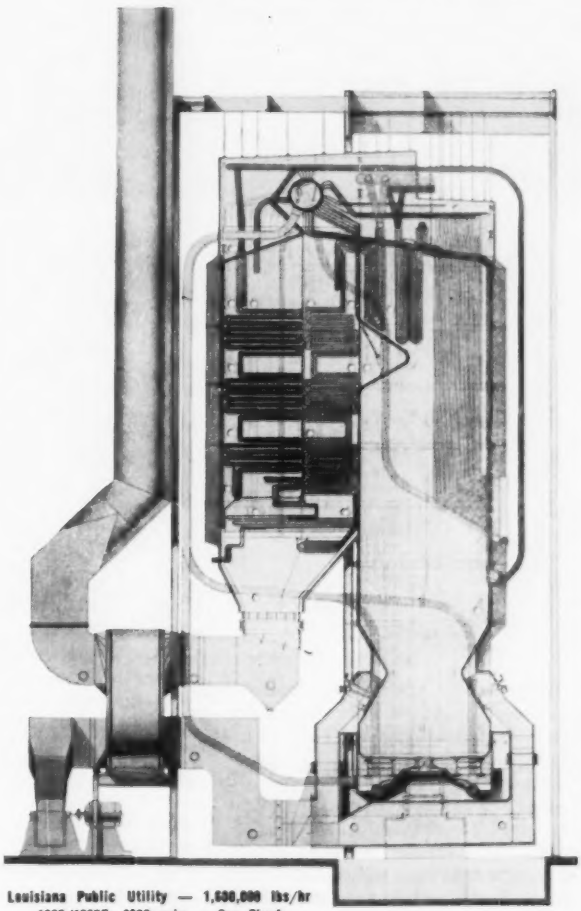
A survey of your plant by a qualified consulting engineer could show ways of making surprising savings in your power costs.

Helps To Lower The Cost Per KWH

- Flyash reinjected into furnace bottom eliminates cost of disposal, recovers combustibles. Quenched granulated slag is saleable.
- Prompt ignition and stable flame, even under adverse conditions, assure safe operation.
- Permissable higher furnace heat release rates result in smaller structures for given capacities.
- Almost entire absence of furnace wall deposits eliminates need for wall blowers, sustains high furnace efficiency, keeps uniform furnace performance.
- Opposed firing and uniform firing across the entire furnace width remove the limitations on furnace widths inherent in other firing methods.
- One level burner operation results in lower building costs and ease of operation.



Texas Public Utility — 825,000 lbs/hr
1005/1005F; 1750 psig — Gas and Oil Fired



Louisiana Public Utility — 1,600,000 lbs/hr
1005/1005F; 2350 psig — Gas Fired

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RILEY

STEAM GENERATING & FUEL BURNING EQUIPMENT

Even your dome light draws more current than MOTRAC 2-way radio!

Motorola ends costly power drain problems and idling expense with the first fully transistorized receiver and power supply

What makes Motorola MOTRAC radio the most economical and reliable 2-way radio unit in the annals of mobile communications? Not just one or two new features, but a score of revolutionary design advancements that bring you the very finest set ever engineered.

1. On standby—the MOTRAC receiver draws only a trickle of current—actually 80% less than conventional units—with an occasional increase to maintain crystals at proper temperature for precise on-frequency operation (even your dome light draws more current than MOTRAC radio). Yet, this radio is always poised for instant reception, thanks to its fully transistorized receiver. Result: no life-shortening battery drain . . . no more costly, unnecessary engine idling.

2. MOTRAC radio eliminates the most common maintenance problems: vibrators in the power supply and tubes in the receiver. All are replaced by stabilized long-life transistors.

3. Up to 40°F cooler operation means less aging and strain on components. Reason: no more receiver tube filaments; a more efficient power supply; a battery saver switch to cut off transmitter filaments; and two separate heat sinks—one for power supply, another for transmitter output tubes.

4. The MOTRAC receiver operates directly from the 12-volt battery; its low voltage operation results in less electrical strain on components, assures long life.

5. Traditional Motorola engineering and production excellence are evident throughout MOTRAC radio. Transistors undergo three separate checks, including a week of stabilization at 185°F. Only industrial-type tubes, especially suitable for the rigors of mobile operation, are used in the transmitter.

6. Patient production testing continues under stringent quality control procedures. First, each module is tested. Then each chassis is independently checked. Next, each radio is tested as a composite whole. Finally, the entire radio and associated accessories are checked out as a complete operating system.

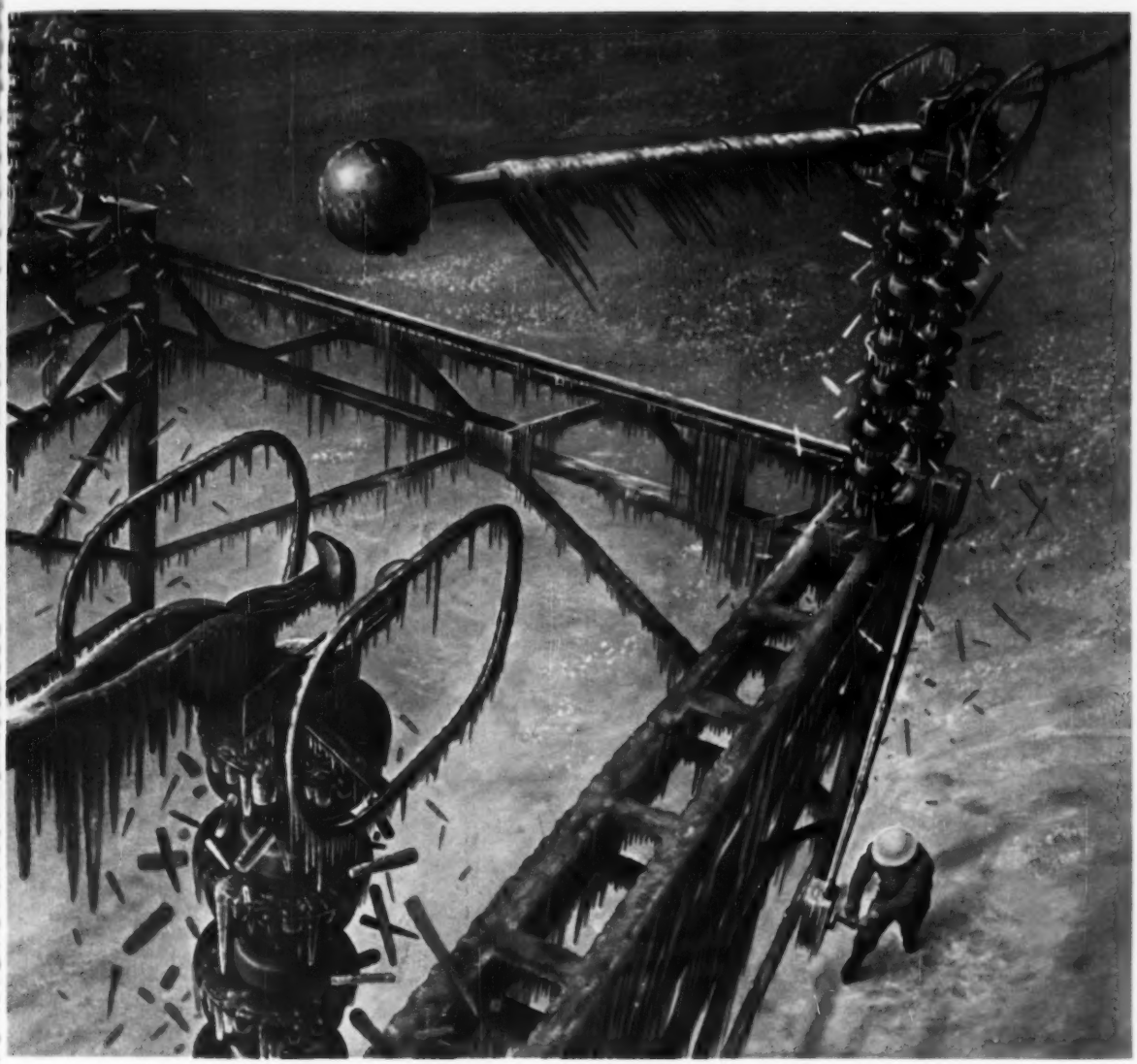
7. MOTRAC radio is conservatively designed. The receiver has *even higher* reserve gain than conventional Motorola units to assure *peak performance* for many years. Also, power supply transistors are operated under an exceptionally high safety factor to assure extended service life.

8. Completely independent receiver and transmitter chassis, with no power supply in common, assure reliable reception regardless of transmitter performance.

9. MOTRAC radio offers you 2½ to 3 times higher audio output than conventional sets.

10. MOTRAC radio is designed for split-channel operation. *Both* receiver and transmitter meet critical split-channel stability frequency requirements.

Experienced users have been field testing MOTRAC radios for many months. The results are in—and they're excellent. We'd like to tell you *all* about them. Write, wire or call: Motorola Communications & Electronics, Inc., A Subsidiary of Motorola, Inc., 4501 West Augusta Blvd., Chicago 51, Ill., SP 2-6500. MOTRAC is a Motorola, Inc. trademark.



Winter brings the menace of ice that power utility men dread. But I-T-E switches smash out with almost summertime ease. Here Ned Seidler paints the dramatic moment when the icy bonds are shattered.

SMASHES OUT OF INCH-THICK ICE TRAP

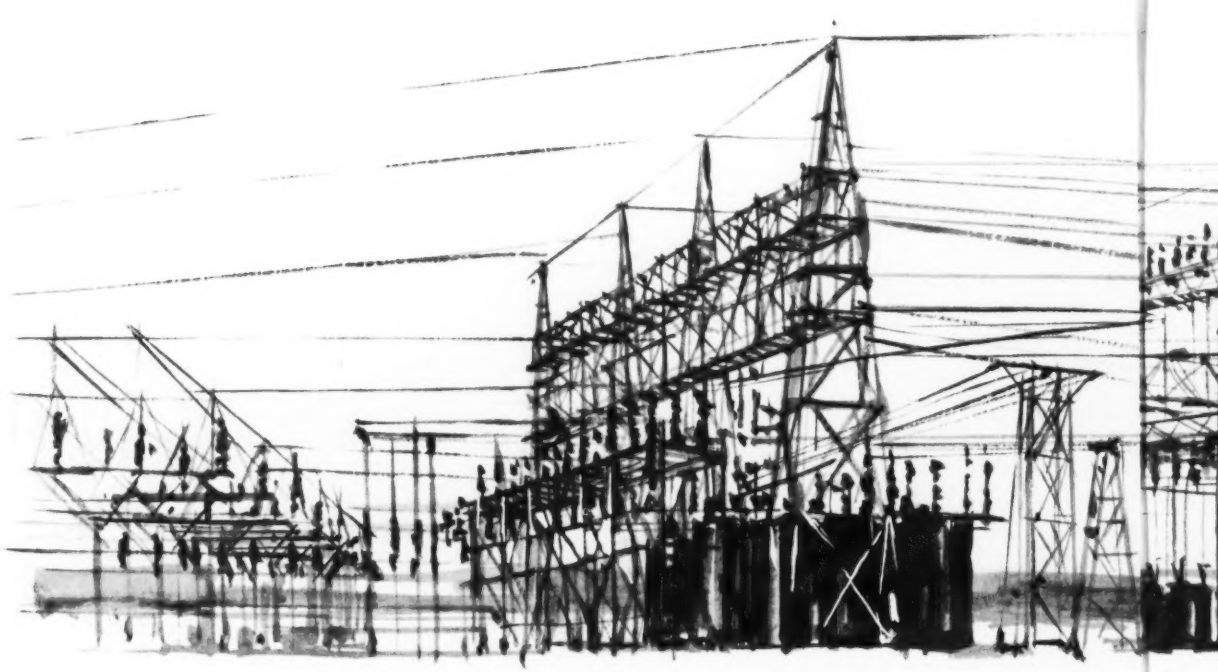
Even under an inch-thick blanket of hard ice, I-T-E high voltage air switches open with ease and safety—the result of countless design details.

Blades rotate completely free from the contact jaws before lifting begins . . . breaking out of the ice lock in the process. Rotating insulators turn easily on sealed, greaseless ball bearings. Shattered ice falls harmlessly aside, since there are no compression points in the entire switch. A child could open this switch . . . so little force is required. Yet the double protected, pressure-loaded hinge contacts insure high conductivity and high thermal capacity all the years the switch is in use.

Switches are available in ratings to 1470 BIL. Tests prove they have the lowest radio influence level in the field.

Turn page and see how other I-T-E products can help you too

I-T-E | **I-T-E CIRCUIT BREAKER COMPANY**

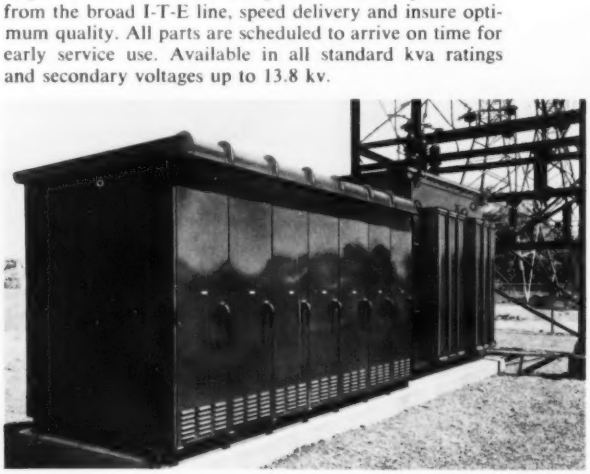


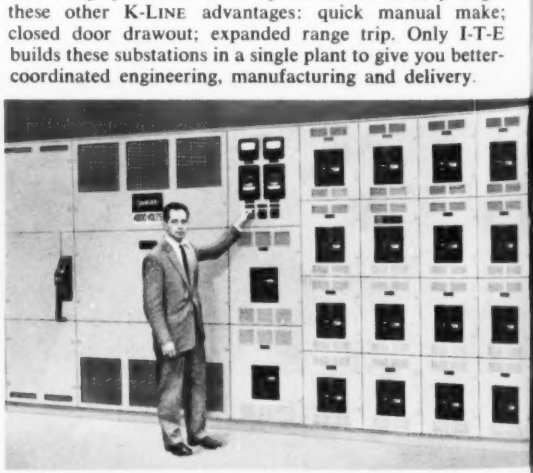
GET MORE FOR YOUR MONEY

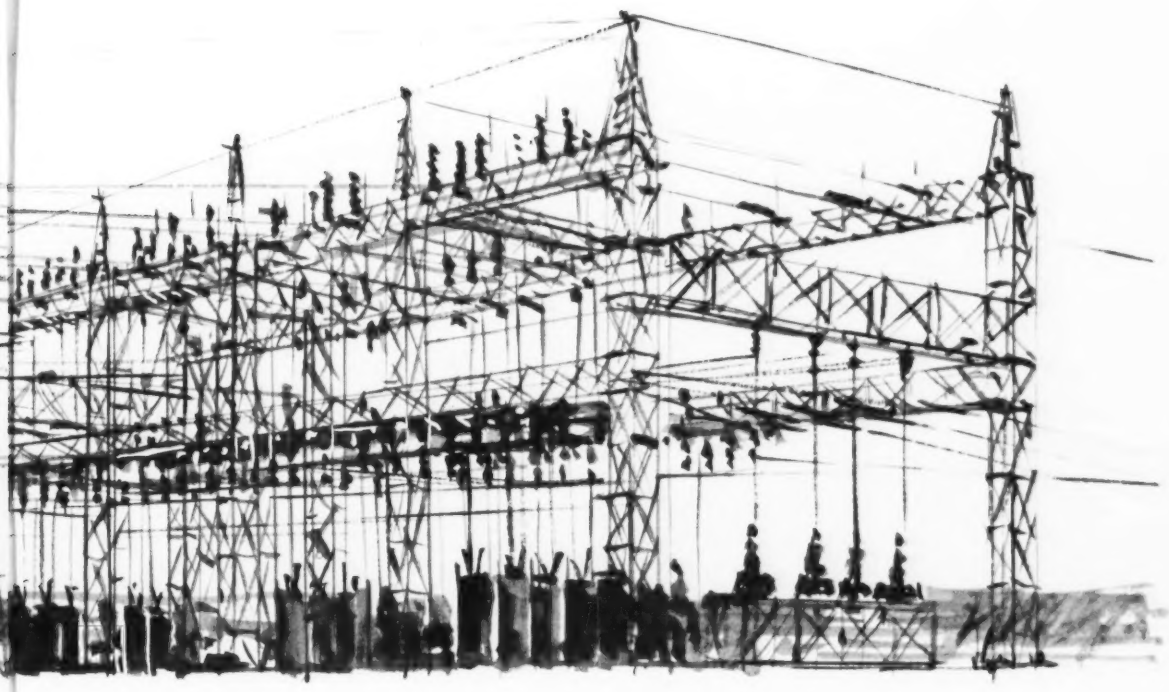
THE BROAD I-T-E LINE GIVES YOU CONSISTENTLY

Designed and built to meet your own requirements exactly. You pay no extra for I-T-E Primary Unit Substations, but you get custom designing and construction to meet your exact power, space and future expansion requirements. Standard components, skilfully selected from the broad I-T-E line, speed delivery and insure optimum quality. All parts are scheduled to arrive on time for early service use. Available in all standard kva ratings and secondary voltages up to 13.8 kv.

New, more compact secondary unit substations. Save space at your generating station. Now I-T-E secondary unit substations need less space than ever. K-LINE circuit breakers stack four high in ratings up to 600 amp. They save roughly one-third the space. In addition, you get these other K-LINE advantages: quick manual make; closed door drawout; expanded range trip. Only I-T-E builds these substations in a single plant to give you better-coordinated engineering, manufacturing and delivery.



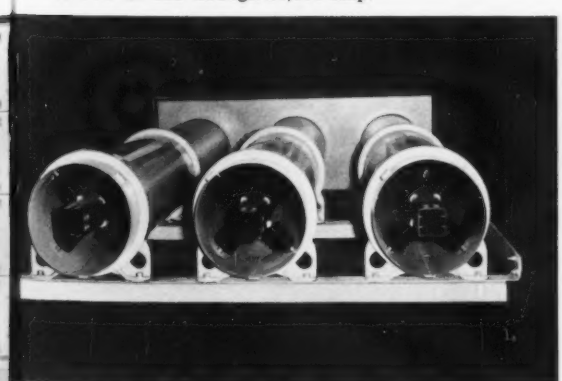




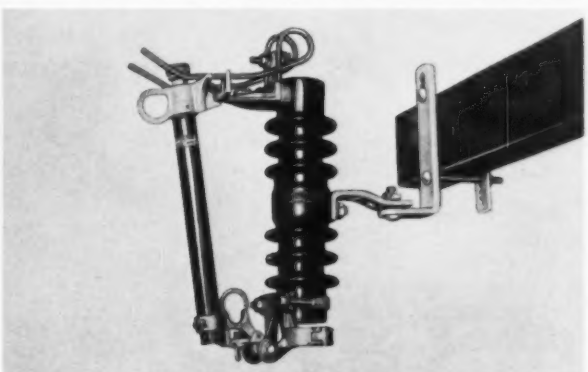
Efficient design and fast installation save you double. I-T-E outdoor substations have one particularly significant advantage over others. Structures are completely designed and fabricated in a single plant. I-T-E assumes complete responsibility . . . coordinates engineering and manufacturing every step of the way, from layout drawings and application of blade switching equipment to finished and carefully identified structural parts. Only I-T-E offers a background of 50 years' unified service. I-T-E introduced the all-aluminum utility substation structure in 1947.

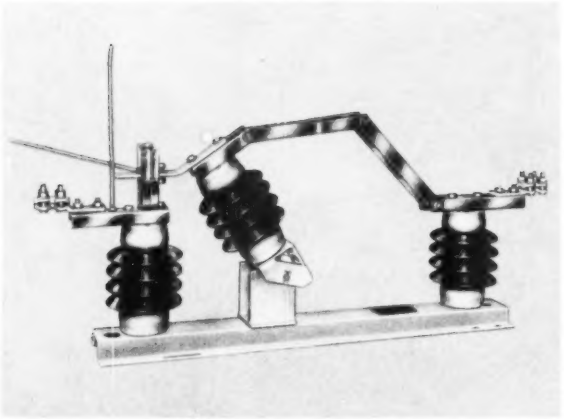
HIGHER QUALITY. . . COSTS NO MORE

Safer, more compact main bus. Not a single case of phase-to-phase short circuit has ever been reported on I-T-E Isolated Phase Bus since I-T-E introduced it 22 years ago. Such performance is proof of good design and consistently high-quality construction. I-T-E uses cylindrical enclosures for superior heat dissipation, easier gasketing, lower cover losses, better shape retention with internal pressure, and saving in weight. Ratings from 4.16 to 34.5 kv and through 20,000 amp.

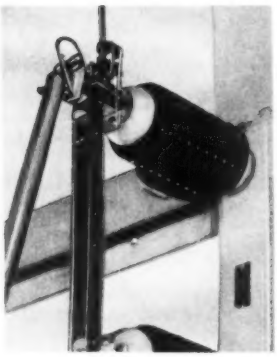


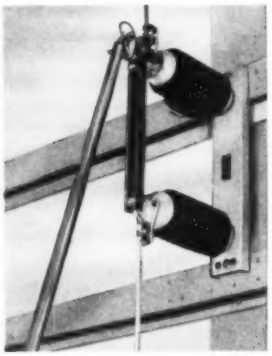
More of everything you want in a distribution cutout. Single basic design with choice of two fuse holders covers full range of NEMA standard ratings. Uses any standard NEMA fuse link. Expendable cap design provides optimum performance at low and medium fault currents, still maintains a large margin over rated maximum interrupting ability. Cutout converts easily from open to load-break type. Mechanical interlock gives lineman complete control of load break operation. Insulators 100% tested.





Shuntless tilting insulator switches. Notice the absence of corrosion-prone flexible braid on this I-T-E tilting insulator switch. Instead there's a durable current-carrying linkage with silver to copper contacts at each hinge point. Silver to copper is also used between the blade and jaw contacts. Pantograph is of hard-drawn copper that resists corrosion and gives longer life. Current rating can be increased with parts supplied in an easy-to-use conversion kit. Switch voltage ratings from 7.5 through 34.5 kv.





It tells you when it's shut. You never have to wonder if one of these new I-T-E hook-operated disconnecting switches is fully closed. It goes "snap" . . . out loud so you can hear it. In addition the extra-large latch members give you visual evidence too. Parallel blades are widely spaced and heavily braced for maximum rigidity. Roomy hook-stick eye and pryout motion in opening contribute to the easy operation of the switch. Ratings: 7.5 through 69 kv, 600 and 1200 amp; also made with tubular construction rated up to 161 kv, 3000 amp.

I-T-E Circuit Breaker Company U-6

1900 Hamilton St., Philadelphia 30, Pa.

- ☐ High voltage air switches
- ☐ Outdoor substation structures
- ☐ Primary unit substations
- ☐ Secondary unit sub-stations
- ☐ Isolated phase bus
- ☐ Distribution cutouts
- ☐ Tilting insulator switches
- ☐ Hook-operated switches
- ☐ Metal-clad switchgear (4.16 and 13.8 kv)
- ☐ Power switching centers
- ☐ Molded case circuit breakers
- ☐ Other .....

Name .....Title .....

Company .....

Street .....

City .....Zone .....State .....

MAKE IT A HABIT!

Think of I-T-E whenever you buy electrical equipment. Detailed literature available on every product. Send coupon now.

I-T-E CIRCUIT BREAKER COMPANY

The Electrical Week

LATE NEWS ▶ **New York PSC clears Con Ed on August blackout** of charges that inadequate network design was responsible. PSC is unable to explain why seven of 20 feeder cables failed simultaneously, but found excessive moisture seeping into cables caused most of the failures. It added there was no pattern of relationship among the failures.

First 345-kv cable shipped to Cornell for AEIC-EEI-sponsored EHV cable testing program. Cable is pipe-type, with 500-Mva capability.

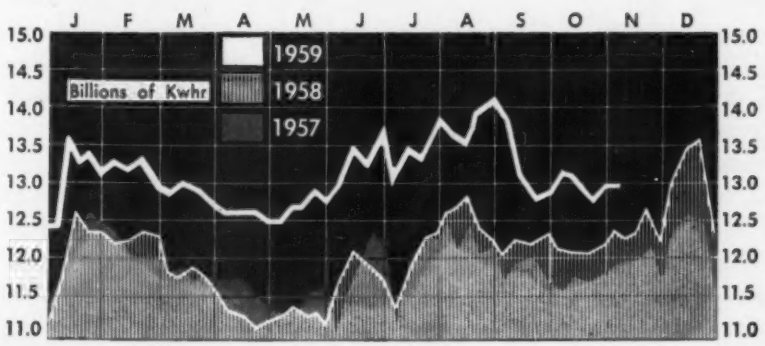
Recent Elections . . . Glasgow, Ky., votes 1,371-1,189 not to take over Kentucky Utilities properties. Princeton, Ky., votes 1,103-868 the other way. In latter contest, five KU employees file suit asking election be declared invalid. In third vote, KU wins indirect victory when R. G. Cherry is elected mayor of Paducah over opponent who campaigned for public power . . . Decatur, Ind., voters favor sale of its plant to Indiana & Michigan Electric, reversing earlier vote.

Highlights of EEI Accident Prevention meeting . . . Successful tests on dogs with portable prototype defibrillator indicate use of unit on line trucks is feasible . . . John Hopkins researchers find mouth-to-mouth resuscitation with external heart massaging can sustain shock and burn victims until defibrillator can be used.

Around the States . . . Arkansas Supreme Court rules for Arkansas P&L to serve Little Rock Air Force Base . . . Ohio Supreme Court reaffirms Court of Appeals ruling of Euclid Ordinance requiring lines higher than 33-kv to go underground.

Management changes . . . Montana Power elects George O'Connor and W. W. Talbot vps . . . Cia Panamena de Fuerza y Luz names T. E. Oglesby president . . . AEIC elects R. G. Rincliffe (Philadelphia Electric president) president and N. V. Gussett (Iowa P&L chairman) vp.

WEEKLY POWER OUTPUT—Up 5.8% (Week ending Nov. 7), Kwhr 13,019,000,000



Per Cent Change From Previous Year

	Oct. 24	Oct. 31	Nov. 7
Total U. S.	+ 4.8	+ 5.3	+ 5.8
New Eng.	+ 3.7	+ 3.2	+ 3.7
Mid. Atlan	+ 4.9	+ 4.2	+ 5.5
Cent. Ind.	+ 4.0	+ 3.3	+ 2.1
West. Cent.	+ 4.5	+ 6.1	+ 6.3
Southeast	+ 5.1	+ 5.7	+ 6.7
South Cent.	+ 4.4	+ 9.7	+11.2
Rocky Mount.	+ 1.4	+ 4.0	+ 4.4
Pacific			
NW	+ 5.2	+ 4.4	+ 7.6
SW	+ 9.1	+ 9.8	+ 9.9

Seasonally Adjusted Index 251.3

Week Ago 250.2 Year Ago 237.1

Source: Edison Electric Institute

Preview of this Issue

EVENTS ▶ **Northeastern Ohio may have a second coal pipeline** running from the East Liverpool area to Ashtabula. The line, if built to a 14-inch size, will have an estimated annual capacity of 3 million tons **(p 64).** Utilities find that the employment of disabled workers pays off **(p 66)** . . . Mexico's Federal Electric Commission plans to spend more than $900 million in the next five years to add at least 2,500 Mw more capacity **(p 140)** . . . Con Edison wins pollution decision which enables company to use gas-fueled boilers in the Waterside plant near the United Nations headquarters **(p 148).**

PROGRESS REPORT EW'S HEATING & HEAT PUMP CONFERENCE ▶ **Electric heating will not be sold unless utilities** put out aggressive, hard-hitting sales programs. This was one of several main points emphasized at Electrical World's Fourth Electric Space Heating and Heat Pump Conference Oct. 21-22, as outlined on **p 71.**

ENGINEERING ▶ **Aerial patrol spots right-of-way intrusions early** and enables Virginia E&P to complete four system inspections a year. Yet Vepco uses it to supplement rather than replace necessary foot patrol **(p 83)** . . . Electric supply on a 24-hr basis brings startling transformations in the daily life of a Peruvian agricultural community and fosters small industries. Oil fields and lack of hydro prompted construction of a

Politics and Public Power

A SIMMERING POT OF ALLOCATION

A simmering dispute between the Upper Colorado basin states and the Bureau of Reclamation over proposed power allocations from the federal Glen Canyon and Flaming Gorge dams has been softened, but not stopped.

Reclamation points out that marketing plans are "only in the preliminary stages," and the states will have ample opportunity when plans are more definite. The Bureau, however, has not agreed to deal through the states, or the Upper Colorado River Commission, for its marketing arrangements.

Particularly disturbing to Colorado is a planned 230-kv transmission line to wheel federal power and interconnect Glen Canyon and Flaming Gorge, being built jointly by Utah Power & Light Co and Arizona Public Service Co. This line, running through Salt Lake City, doesn't come near enough to Colorado to suit that state, since Colorado fears that the cost of transmission to some of its preference customers from such a distant line may reduce the amount of power allocated within its boundaries.

Colorado would like to see the initial line bend eastward toward the proposed Curecanti project on the Gunnison River, Colo., thereby shifting the entire transmission backbone towards its borders. As now planned, an eastern leg would be built later from the Glen Canyon-Flaming Gorge line to connect with Curecanti, when that project is built.

At least $89-million of transmission lines to wheel Upper Colorado has been planned by power companies in the area: Utah P&L, Arizona Public Service, Pacific Power & Light (Wyoming division), Southern Wyoming

diesel plant by a foreign company once the government had created a favorable atmosphere (p 84) . . . Power generation is a Russian weapon in the continuing economic war with the West, the Rocky Mountain Electric League is told at Colorado Springs (p 86).

PROCUREMENT & PRODUCTS ▶ **NEMA votes sweeping reorganization.** New association structure designed to give members faster, more direct action . . . Medallion Home Program to be administered by NEMA (p 68) . . . Buyers display caution—don't want to be caught short, but must be protected . . . Rise in steel prices is foreseen (p 102) . . . Open cutouts in voltages to 27 kv provide fault-current protection to distribution systems (p 110).

MANAGEMENT ▶ **There's more to area development than peddling industrial sites.** For a utility's area development program to be worthwhile, it should consider overall development of communities in its service area, not just how many new factories it can bring in. Details, from EEI's Sixth Area Development Workshop, appear on p 129.

SELLING ▶ **Dehumidifier campaign fills its quota ten times over** as United Illuminating Co stresses 15-day free trial (p 135).

Utilities, California-Pacific Power, Public Service of Colorado and Public Service of New Mexico. Another $41-million of transmission lines would be built by the Bureau. And, in addition, a small leg of high line would be operated by Moon Lake Co-op, Utah, over an oversize REA-financed line which it built to deliver power into the Flaming Gorge site for construction work.

At issue is how preference power allocations from the federal projects will be marketed in Upper Colorado River states—Utah, Wyoming, Colorado, New Mexico, and Arizona. Since all the approximately 1-million kw of power from the projects is expected to be requested by preference groups, the division of preference power will be ticklish.

The Upper Colorado River Commission and the state of Colorado have asked that the bureau maintain "primary liaison" with them before it allocates power to preference customers. Colorado Gov Steven McNichols emphasized in a letter to the Interior Department that he understands "the Bureau of Reclamation is now effecting its primary liaison with prospective power users . . ."

The Bureau, however, has agreed only to give the states "reasonable opportunity to review and comment on proposed plans for power allocation and construction of transmission lines." Primary liaison, as requested by the states, has not been agreed to, says Reclamation, because the Secretary of Interior "has certain primary responsibilities which he cannot abrogate even if he desired . . . These are matters, of course, which are directly related to the inherent responsibility of the Secretary of the Interior for the marketing of power . . . (and) to assure repayment of the project . . ."

Executive Reader

Fundamental and applied aspects of dielectrics and dielectric phenomena, as covered in material published in U. S. and foreign literature during 1958, are covered in Volume 22 "Digest of Literature on Dielectrics." This volume at $5.00, or back volumes to Volume 11 at the same price, or Volumes 1-10 (1936-46) reprinted under a single cover at $10.00, may be obtained from the Printing and Publishing Office, National Academy of Sciences-National Research Council, 2101 Constitution Ave, NW, Washington 25, D. C.

Wider and more desirable understanding of engineers and engineering by news writers and editors is the objective of a series of ads that will appear in "Editor & Publisher", the business magazine of the newspaper profession. The series will emphasize that the work of engineers is most important to such news-making developments as a new building, the building of a bridge, the perfection of a process, or the opening of a mine. **Engineers Joint Council, New York, N. Y.**

Thermal shock properties equal to some metals at 1,200 C are characteristics of a ceramic developed by Admiralty Material Laboratory in England. Designed for gas-turbine stator applications, the ceramic basically is a silicon nitride stiffened with a 5% dispersion of silicon carbide to improve the creep strength. A non-shrink characteristic makes it superior to other ceramics in its formability to close tolerances by conventional machining techniques. **McGraw-Hill World News, London.**

Two condenser shells in tandem connected by a center water box will accommodate the dual low-pressure exhausts of the No. 3 unit at Alabama Power Co's Barry Station. This condenser arrangement reduced equipment cost substantially; eliminated the need for tubes longer than 30 ft; allows for back washing and one-pump operation at the lowest possible cost; and provides a practical solution to thermal expansion problems associated with dual-exhaust turbines.

Constant-dollar cost of fuels will not rise appreciably during the next 16 years because the nation has fuel resources in sufficient supply to meet estimated needs through 1975. While energy from oil shale and solar energy will be insignificant, and available only in minor amounts from nuclear power, energy from water power will rise 120%, from natural gas 107%, from oil 95%, and from bituminous coal 75%. Use of anthracite coal for energy production will drop 30%. Consumption of electric energy will increase 210% in the same period. **Bruce C. Netschert and Sam H. Schurr, Resources for the Future, Inc, before a joint Congressional economic subcommittee, Washington.**

LINE MATERIAL'S own fleet of trucks delivers many Round-Wound transformers to warehouses. **Inventories are maintained at levels that assure you of 24-hour transformer deliveries.**

L-M Provides 24-Hour Stock Delivery For Most Round-Wound® Transformers

Complete inventory of Round-Wound Transformers tailored to your requirements is just a telephone call away.

by **A. R. WAEHNER**
Director, Transformer Product Sales
Line Material Industries

We organize and maintain transformer warehouses for just one purpose—service for you. A total of 57 individual warehouses are strategically located throughout the country to provide you with 24-hour Round-Wound transformer delivery.

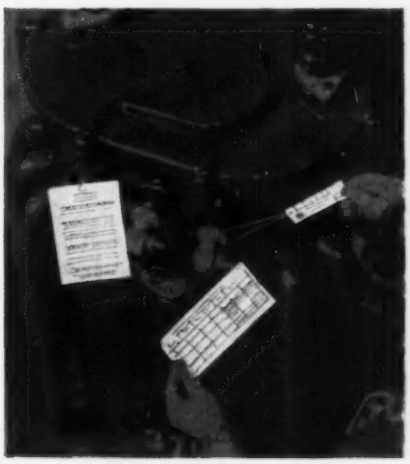
The inventory of this stock network is a precise calculation based upon statistical facts. The kva and voltage ratings, the type of transformer you use on your system, your projected needs and your historic and seasonal buying patterns are all considered in establishing each Round-Wound stock. A warehouse stocked with the transformers you need is near you, ready to ship transformers to you in the size and type you require.

Inventory reporting is quick and concise. Stocks are replaced almost as quickly as transformers are shipped.

All warehouses are linked together by means of a teletype network. If you order a size or type temporarily out of stock, a neighboring warehouse will most likely have it. Your Round-Wound requirement can be started on its way to you within minutes. You still get 24-hour service.

All L-M Round-Wound transformers are crated for protection and ease of handling. The base of the crate serves as a fork lift pallet. The crate is not supported by the transformer it protects. You can stack L-M Round-Wound transformers on top of each other, saving much valuable space in your warehouse.

Get Complete Information . . . Call your L-M Field Engineer and get complete information on the transformer stocks and warehouse facilities at your disposal. The better acquainted you become with L-M warehouses, the more service we can offer you.



Each Line Material Round-Wound transformer has its performance data, test results and other pertinent data recorded on an IBM card. This information is microfilmed so that it is available to you at any time.

LINE MATERIAL Industries Transformers

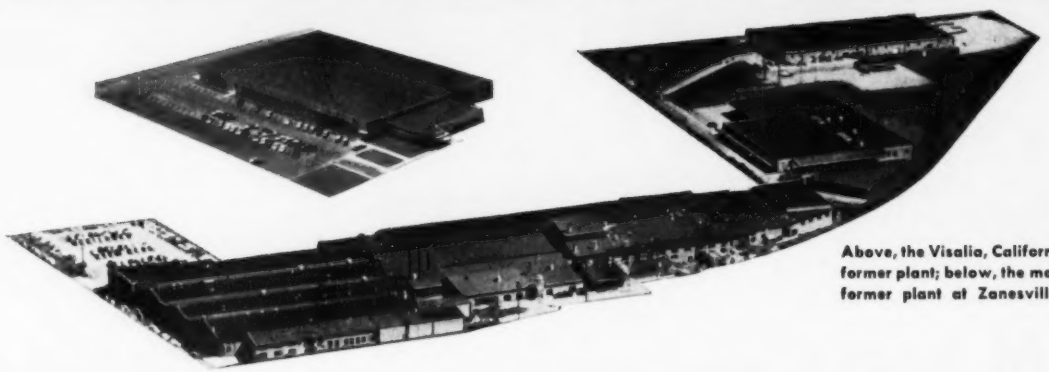
McGRAW-EDISON COMPANY

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS
POWER SWITCHING EQUIPMENT • PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING
LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

McGRAW-EDISON

QUARTER CENTURY OF TRANSFORMER DESIGN RECALLS MANY L-M CONTRIBUTIONS

Silver Anniversary



Above, the Visalia, California transformer plant; below, the main transformer plant at Zanesville, Ohio.

L-M makes many contributions in 25 years of Transformer Design

1934: **L-M... the smallest transformer manufacturer in the industry**

1959: **L-M...the third largest producer of distribution transformers**

Back in 1934, Line Material had been in business for 23 years making a variety of distribution items for electrical utilities. With ambitious hopes and an earnest desire to offer even better products to the industry, L-M added distribution transformers to its line of products. Through the purchase of an existing transformer manufacturing company, L-M acquired ability, practical experience, and the services of some young engineers with new and then untried ideas.

A New Design Principle . . . In this atmosphere of youth, sincere ambition, and eagerness to do something better—which has always characterized Line Material—an entirely new, completely unorthodox, idea was born. This, today, is known as the Round-Wound transformer.

The Round-Wound transformer, with its exceptional and entirely unmatched performance characteristics, has been a major contribution of this company to the art of distribution transformer design.

Hundreds of L-M Developments . . . Line Material's research and development engineers have made literally hundreds of contributions to distribution equipment and practices. In distribution transformers, whose silver anniversary L-M is celebrating, are many that are well known to industry engineers and executives.

Oxidation-Resistant Transformer Oil . . . L-M was the first to introduce ORTO, an inhibited oil, as an aid to increased transformer life. The idea was soon quickly adopted by almost every manufacturer.

Obround-Smaller, Lighter . . . Line Material first introduced the obround tank shape, which made it possible to reduce size and weight without sacrificing performance characteristics.

L-M's Pad-Mount—The Better Way! Line Material was the first to design an aboveground transformer for underground service. L-M's Pad-Mount Transformer is generally recognized as a major contribution among those utilities facing the problem of developing underground distribution systems at the lowest possible cost.

Then—L-M SRT! Line Material's Self-Regulating Distribution Transformer is another outstanding L-M engineering development that still has not been matched in the industry.

Ask The L-M Field Engineer! L-M employs few "salesmen." Its men are *Field Engineers*—technical men with engineering degrees whose interest and responsibility are to serve the customer. That's why we always suggest, "Ask The L-M Field Engineer."

We say it now: Ask him—for information about Line Material, its services, its products, and especially, in this Silver Anniversary year, about the outstanding distribution transformers that are the proud product of this progressive, customer-minded company. Line Material Industries, Milwaukee 1, Wisconsin.

"Round-Wound," "ORTO," "Pad-Mount," and "SRT" are trademarks of Line Material Industries.

LINE MATERIAL Industries

McGRAW-EDISON COMPANY

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS
POWER SWITCHING EQUIPMENT • PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING
LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

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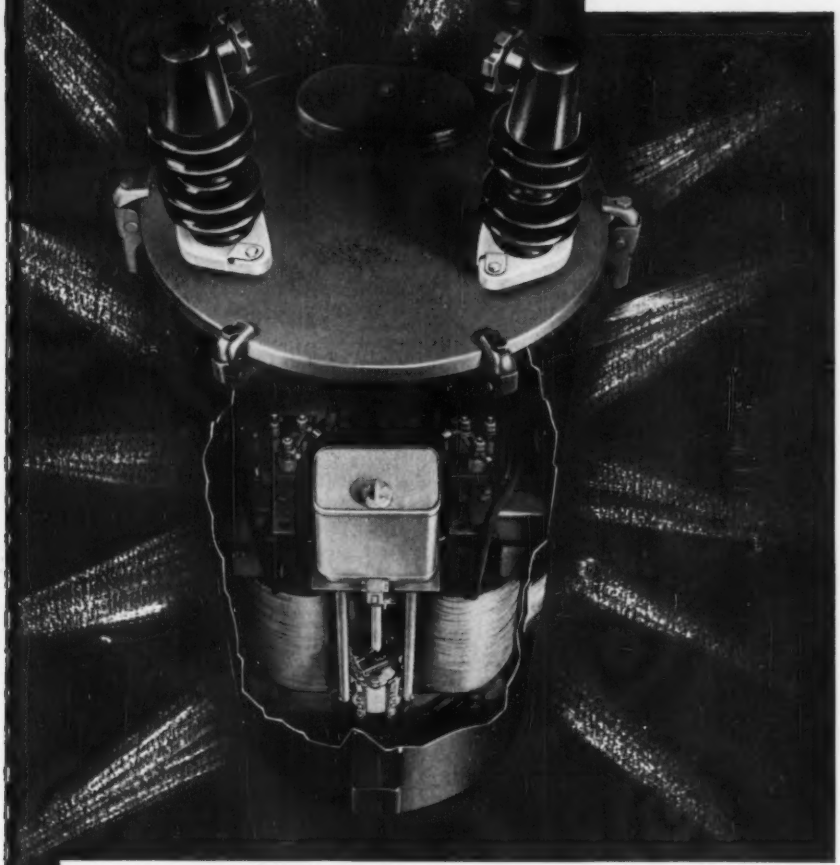
SOME L-M CONTRIBUTIONS TO TRANSFORMER DESIGN

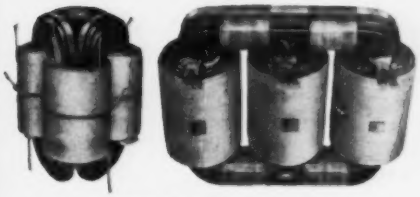


ORTO (OXIDATION-RESISTANT TRANSFORMER OIL)

Line Material was the first to introduce an inhibited transformer oil that resists oxidation, acidity, and sludging. ORTO lasts several times as long as conventional transformer oil thus assuring longer transformer life. The advantages of this contribution were recognized and thereafter adopted by all major transformer manufacturers.

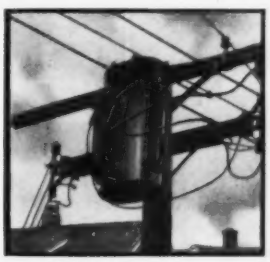
ROUND-WOUND TRANSFORMER

Round-Wound, is the first and only transformer with uncut, wound core and round coils wound directly on the core. This *Round*-coil, *Wound*-core is a balanced design that provides optimum overload capacity, long life, low losses, low exciting current, exceptionally good cooling, low regulation and exceptional mechanical features.



THE WOUND THREE-PHASE CORE

Other L-M firsts are the "Tri-Wound" and the "Uni-Wound" in three-phase designs. There are not just three single-phase cores in one tank. This continuously wound unitary core with round coils combines reduced size and weight with improved efficiency.



OBROUND TRANSFORMER TANK

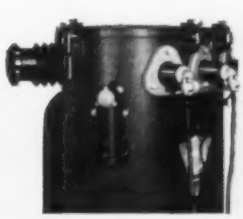
This innovation in tank manufacture reduced overall size and weight without reducing performance. The obround shape brings the center of gravity closer to the pole. This combination of lighter weight and shorter moment arm substantially decreases the total bending moment on the pole, and increases the potential capacity of transformer installations on the pole and crossarms.

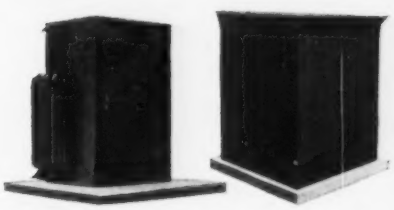
SRT (SELF-REGULATING TRANSFORMER)

The world's only Self-Regulating Distribution Transformer. It is a Round-Wound transformer with taps, and a hydraulic or electronic regulating mechanism sensitive to secondary voltage. The SRT switches primary taps to provide the desired transformation ratio. A significant departure in the field of voltage regulation, it corrects the voltage at the point of use.

TRANSFORMER THERMAL OVERLOAD INDICATOR

An externally mounted transformer overload indicator. Requiring no internal connection, it provides visible indication of overloads on transformers up to 100 kva by means of a drop-down indicator. Actuated by tank wall temperature, the device can be mounted on a bracket provided on all L-M transformers; or through the use of a permanent Alnico magnet mounting can be attached to any make of transformer. Ambient temperature-compensated, it is available with or without indicator light.

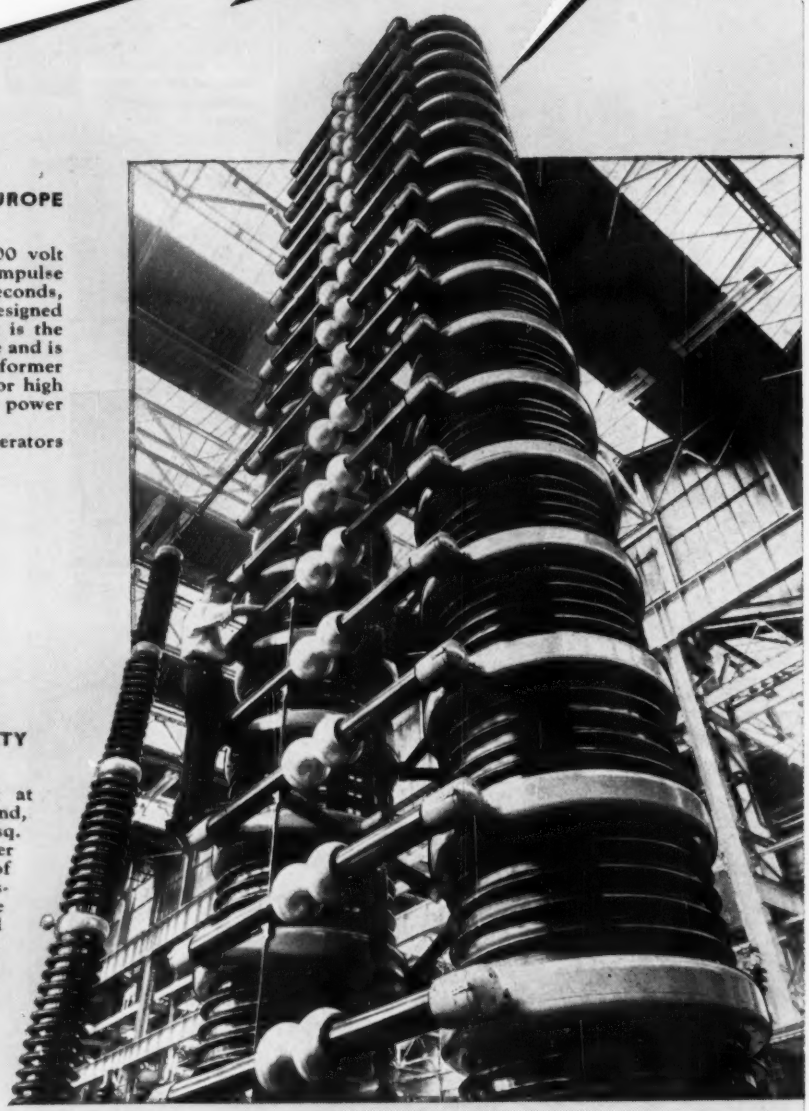




THE PAD-MOUNT AND TRANSCLOSURE

These units provide a convenient means of obtaining attractive, readily accessible transformer installations on underground distribution systems. Bridging the gap between overhead and subway installations, they are applicable for residential, commercial and industrial areas. The Pad-Mount (left) is a specially designed transformer with locked primary and secondary compartments. The Transclosure (right) is a versatile multisize ventilated steel housing for pole-type Round-Wound transformers, and all associated protective, control, and metering equipment.

4,000,000 VOLTS!



THE LARGEST
IMPULSE GENERATOR IN EUROPE

The illustration shows a 4,000,000 volt 18 stage, 2 column Ferranti Impulse Generator, energy rating 285 kW seconds, D.C. charging 220 kV per stage. Designed and built by Ferranti engineers, it is the largest impulse generator in Europe and is now installed in the Ferranti Transformer Factory at Hollinwood, England for high voltage impulse testing of large power transformers.
Ferranti High Voltage Impulse Generators are used throughout the world.

FERRANTI

OVER 5,000,000 kVA
per annum
of TRANSFORMER CAPACITY

The Ferranti transformer plant at Hollinwood, Lancashire, England, covering an area of over 300,000 sq. ft. has a manufacturing capacity per annum of over 5,000,000 kVA of Large Power Transformers, Distribution Transformers, Voltage Regulators, High Voltage A.C. and D.C. Impulse Testing Plant and Specialised Equipment. Contracts include the supply of transformers for the Garrison Dam and McNary Dam Projects in the U.S.A. and the Alcan Project in Canada.

FERRANTI

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DUNDEE: Kings Cross Road, Dundee, Scotland

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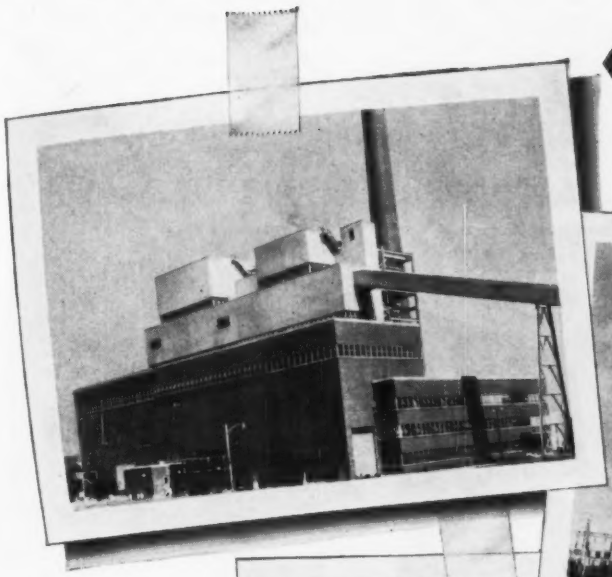
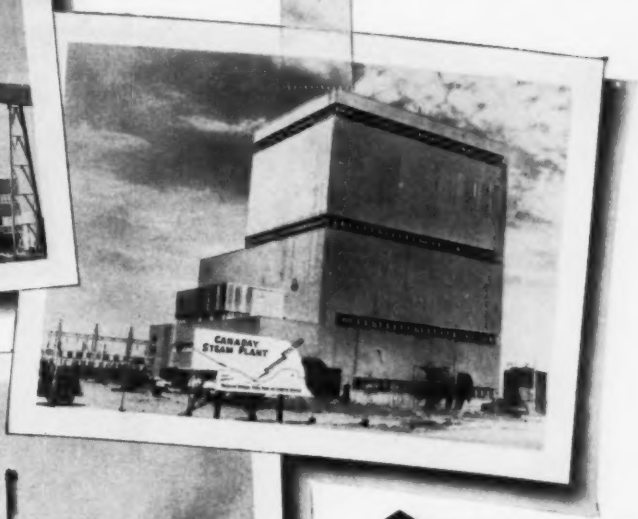
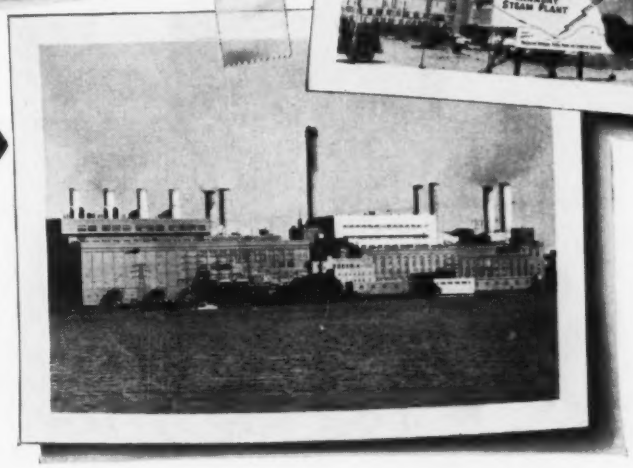


ILLINOIS POWER COMPANY'S Vermilion Plant near Danville, Ill., with 183,000 KW capacity. #2 condenser equipped with 162,288 pounds of Revere Admiralty Condenser Tubes.



100,000 KW CANADAY STEAM PLANT of the Central Nebraska Public Power & Irrigation District. Here you'll find Revere Muntz Metal tube sheets combined with Revere Copper Condenser Tubes.



THE NIAGARA MOHAWK POWER CORPORATION'S Huntley Steam Station, Buffalo, N.Y. with 196,000 pounds of Revere Admiralty CondenserTubes and 29,000 pounds of Revere Muntz Metal tube sheets installed in its Unit #67.

TUBED BY REVERE MEANS TUBED TO LAST

A few more power companies who depend on REVERE Tubes and Plates for performance plus service

Revere's Technical Advisory Service, because of its long and varied experience, is qualified to help in the selection of the alloy best suited to the specific set of operating conditions encountered in your power plant. This experience, which has covered many and varied types of problems, has been instrumental in prolonging tube life for power plants both large and small.

Why not take advantage of this storehouse of knowledge and contact Revere before making the final selection of tubes and plates for your equipment?

COPPER • BRASS • REVERE • ALUMINUM

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

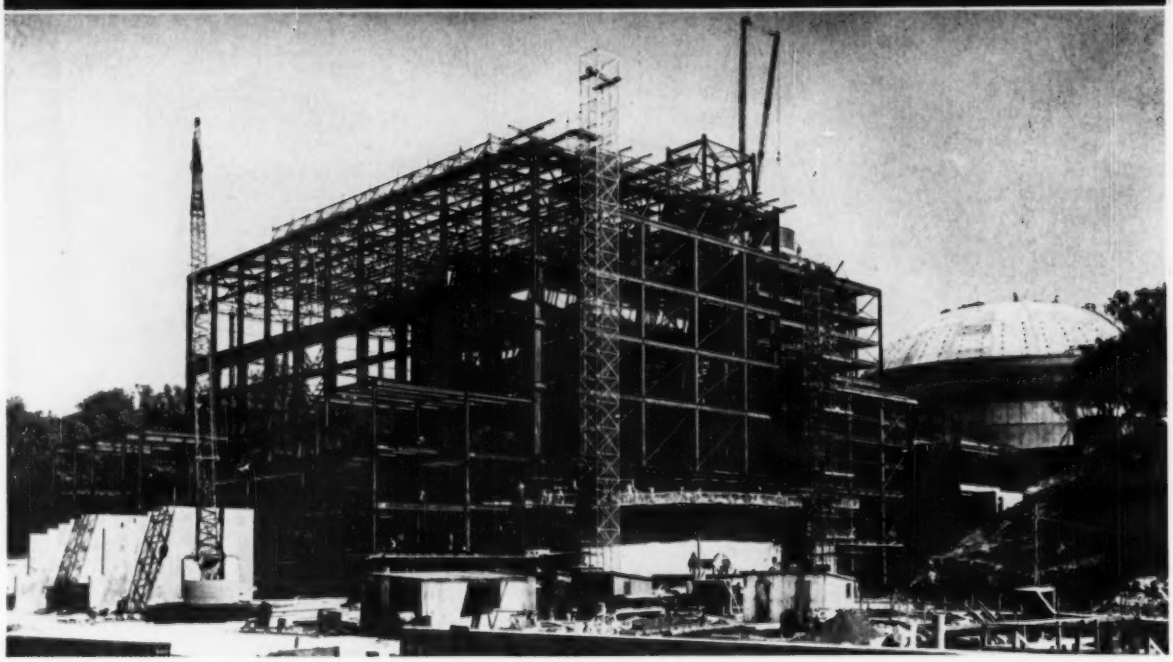
Mills: Rome, N.Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N.Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities. Distributors everywhere.

INTEGRAL FINNED TUBE • BIMETAL TUBE • INSTRUMENTATION TUBE • CONDENSER TUBES IN CUPRO-NICKEL, ALUMINUM BRASS, ADMIRALTY, HERCULOY, ARSENICAL COPPER, MUNTZ METAL AND OTHER ALLOYS. ALUMINUM TUBE, SHEET AND EXTRUSIONS. SMALL AND LARGE PLATES IN CUPRO-NICKEL, COPPER, HERCULOY, MUNTZ METAL, NAVAL BRASS AND ADMIRALTY

Ingalls fabricates and erects over

$3 MILLION

worth of structural steel for . . .



CON EDISON'S $100 MILLION *nuclear power plant*

On the banks of the Hudson, some 35 miles north of New York, a gigantic development of the nuclear power plant of tomorrow is taking shape today. Scheduled for completion in 1961, this $100 million investment in nuclear power technology will benefit the entire industry and the customers it serves.

Almost 8,000 tons of structural steel for Con Edison's 275,000-kilowatt Indian Point plant was fabricated and erected by Ingalls. The superheater and turbine room section required 6,000 tons of structural steel . . . and 2,000 tons were fabricated and erected inside the nuclear containment sphere, shown on the right of photo above.

Ingalls' skill, ability and experience with fabricated steel have been employed on many power plant jobs, including the construction programs of 46 of the nation's leading power companies.

If your company is considering a new power house, or expansion of present plants, you will do well to investigate Ingalls' facilities. Write us today.

STEEL PLATE FABRICATORS ASSOCIATION FOUNDED 1931

AISC

THE INGALLS IRON WORKS COMPANY
BIRMINGHAM, ALABAMA
Plants at Birmingham, Ala. and Verona, Pa.

Ingalls Industries are/ The Ingalls Iron Works Company, Sales Offices: New York, Pittsburgh, Chicago, Houston, New Orleans, Atlanta • **The Ingalls Steel Construction Company,** Sales Offices: New York, Chicago, New Orleans, Pittsburgh, Houston, Atlanta • **Birmingham Tank Company,** Sales Offices: New York, Pittsburgh, Chicago, Atlanta, New Orleans, Pascagoula **The Ingalls Shipbuilding Corporation,** Shipyards: Pascagoula, Mississippi; Decatur, Alabama Sales Offices: New York, Chicago, Washington, Houston, New Orleans, Atlanta

ANOTHER STEP AHEAD IN VOLTAGE REGULATION

New Melalast* cover finish for General Electric voltage regulators increases protection against animal-caused outages

New Melalast cover finish on all pole-mounted General Electric voltage regulators cuts maintenance costs by reducing regulator outage.

This G-E developed modified epoxy resin insulates both regulator and animal visitors from line-to-ground short circuits, yet allows a slight shock to send birds and squirrels on their way. Melalast finish eliminates the need for bushing "bird covers," terminal taping, or line-drop sleeves—cutting installation costs, too.

Superior corrosion resistance of Melalast finish further improves regulator life. Proven-in-service on General Electric distribution transformers, this new finish is better than any other available today.

Melalast cover finish—at no price premium—is an example of General Electric's continuing leadership in voltage regulators. It is another reason why G-E regulators cost less on the line. Ask your regulator representative for more information. General Electric Company, Schenectady 5, New York.

*Trademark of General Electric Co. 423-42

Progress Is Our Most Important Product

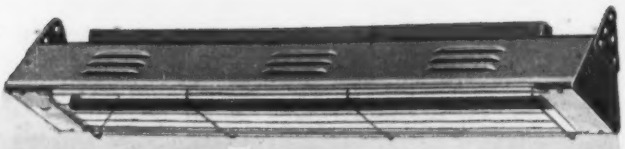
GENERAL ELECTRIC

FULLY INSULATED COVER

Protects Against Outages Caused By Birds and Squirrels

GENERAL ELECTRIC

SUPERIOR DURABILITY of Melalast finish is possible because special grit-blast process cleans, roughens surface for excellent adhesions shown above. Label (left) on control cabinet door identifies Melalast cover finish on your new pole-mounted General Electric voltage regulator.



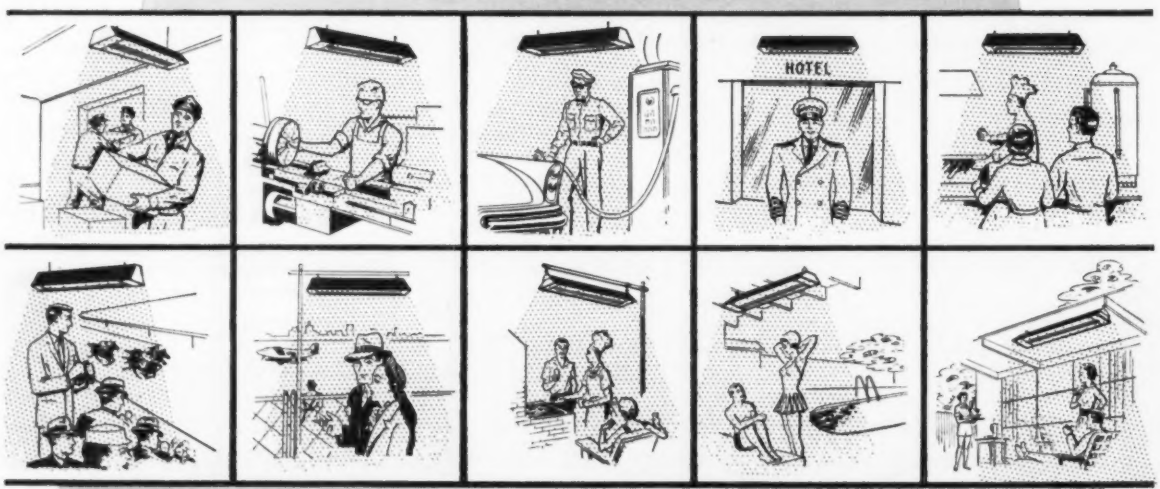
ELECTROMODE® Quartzone TUBE INFRARED *Electric* HEATER

Controlled Area Heating...Indoors or Outdoors

High energy infrared rays emitted from the Quartzone Tube are channeled in a rectangular area by a scientifically designed parabolic polished aluminum reflector, making it possible to concentrate the heat on a specific area, indoors or outdoors. Like the sun, these infrared rays warm persons or objects upon which they are directed, and this warmth is enjoyed regardless of surrounding temperature. *In industry,* this heater has great utility for providing warmth in exposed areas, like loading docks, and in warehouses and buildings with high ceilings; also for spot heating, drying, and many process applications. It is ideal for use in outdoor areas, such as patios, swimming pools, barbecues, etc.

The heater can be controlled by simple on-off switch, time switch or thermostat. Heaters are supplied with universal brackets for chain suspension or for bolting to ceiling and wall brackets. Built to withstand the elements, with a louvered, weather-proof housing, bonderized and finished in gray enamel.

Shown below are a few of the many uses.



The high efficiency of this heater is due to the fused quartz tube. The infrared rays emitted by the metal coils pass through this amazing material without appreciable loss of heat. Heat is *instant.* The Quartzone Tube has high resistance to thermal shock, and even at red heat will withstand splashing rain or snow without cracking. Guaranteed for one year, but in actual service will last many thousands of hours.

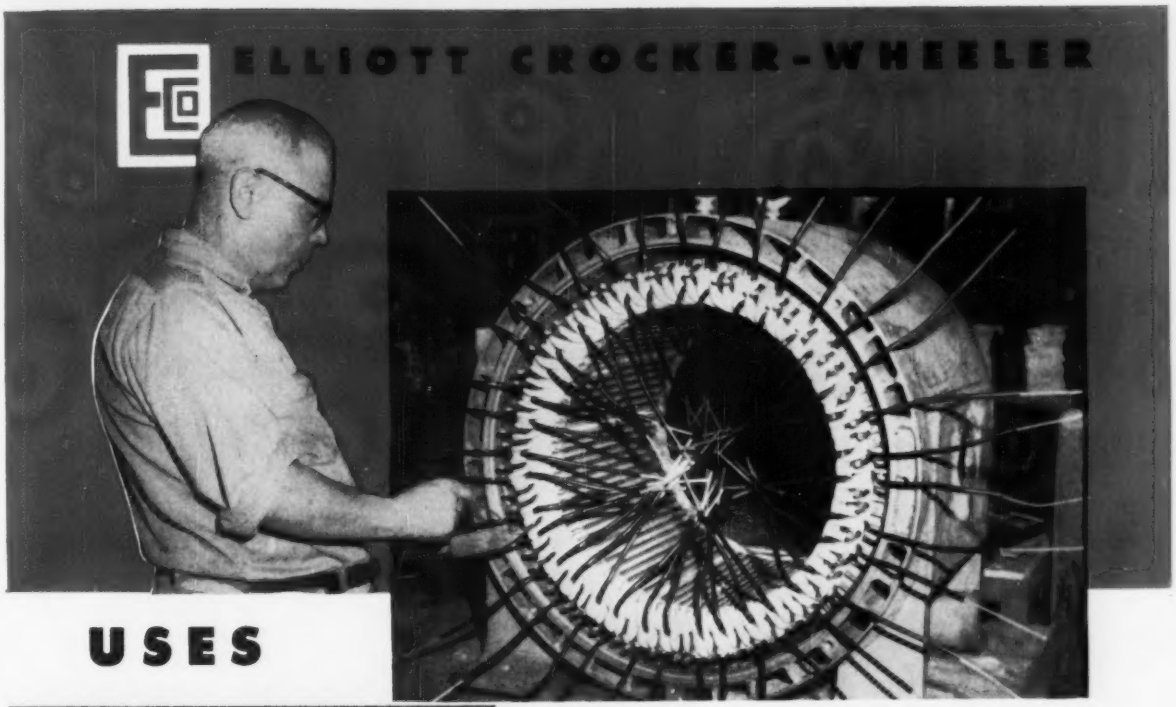
®REG. U. S. PAT. OFF.

Complete Electromode line of electric heating equipment includes: Baseboard Heaters, Wall and Portable Fan-Circulating Heaters, Radiant Convection Panel Heaters, Floor Insert Heaters, Duct Heaters, Radiant Cable Heat, Portable and Suspension Industrial Unit Heaters, and Farm Heaters for Milk House and Pump House.

For complete Information and Specifications ask for Form EC-248.

ELECTROMODE
division of Commercial Controls Corporation
DEPT. EW-59 ROCHESTER 3, NEW YORK

ELLIOTT CROCKER-WHEELER



USES

NATVAR ISOLASTANE® TUBING

Isolastane is Natvar's new elastomeric isocyanate-type coating for Fiberglas® braid and tape. Isolastane tubing being installed on coil leads and connectors of a larger AC motor.

TO INSULATE AND PROTECT MOTOR LEADS

The Crocker-Wheeler plant of Elliott Company builds a wide range of electrical motors in sizes up to 500 hp. Natvar Isolastane tubing is widely used on both large and small AC induction motors.

Isolastane tubing is especially suitable for protection of motor coil leads and connectors because of its uniformly high dielectric value, mechanical strength, and resistance to all oils and solvents commonly used in insulating applications.

When you need flexible insulating materials with good physical and electrical properties and exceptional uniformity, it will pay you to get in touch with your distributor or with us direct.

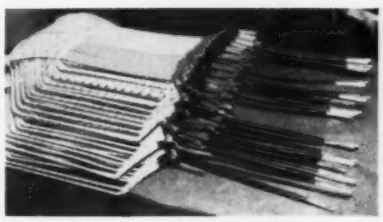
Natvar

Natvar Products

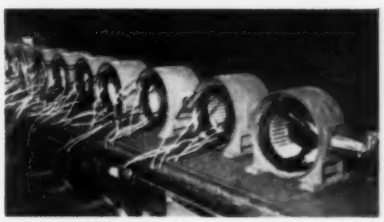
- Varnished cambric—sheet and tape
- Varnished canvas and duck—sheet and tape
- Varnished silk and special rayon—sheet and tape
- Varnished papers—rope and kraft—sheet and tape
- Varnished, silicone varnished and silicone rubber coated Fiberglas®—sheet and tape
- Slot cell combinations, Abaglas®
- Isoglas® sheet and tape
- Isolastane® sheet, tape, tubing and sleeving
- Vinyl coated and silicone rubber coated Fiberglas tubing and sleeving
- Extruded vinyl tubing and tape
- Styroflex® flexible polystyrene tape
- Extruded identification markers

*T.M. (Reg. U.S. Pat. Off.) OCF Corp.

We will be very happy to supply information on any of our products on request.



Natvar Isolastane tubing, as applied to these AC field coil leads flexes easily and gives ample electrical and mechanical protection.



Isolastane tubing, applied to coil leads of these smaller NEMA frame motors will withstand continuous operating temperatures up to about 155°C (class F) and is extremely tough and resilient and resistant to abrasion.

NATVAR CORPORATION

FORMERLY THE NATIONAL VARNISHED PRODUCTS CORPORATION

TELEPHONE FULTON 8-8800

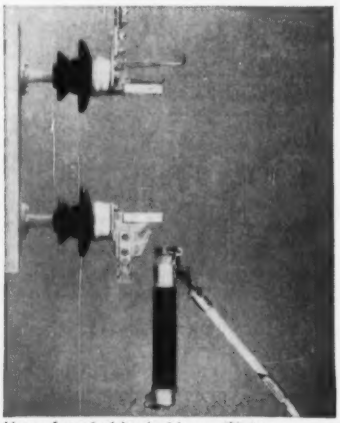
CABLE ADDRESS NATVAR: RAHWAY, N. J.

221 RANDOLPH AVENUE • WOODBRIDGE, NEW JERSEY

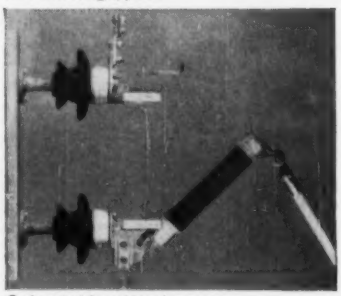
LOW-COST SWITCHING

HOW THE SM-4 SWITCHES

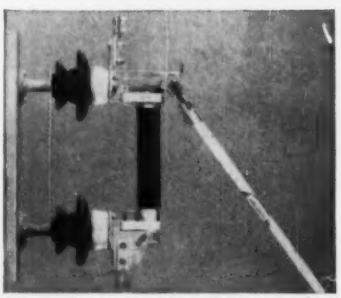
Photo at right shows the fuse being opened with Loadbuster. Photos below show closing sequence with conventional handling tool.



Hang fuse holder in hinge. (Note disconnect gap) . . .



Swing holder closed . . .



No need to worry about closing on a fault —the SM-4, a boric acid fuse, interrupts effortlessly.

Now even power fuses operate with S&C's Loadbuster® — no need to add a disconnect

That's right . . . no disconnect required! If it's S&C's outdoor SM-4 Power Fuse, you switch with the fuse itself—plus Loadbuster.

On transformer primaries there's no separate investment in disconnects for energizing, or for de-energizing and isolating. For line sectionalizing the same holds true—and then some! With Loadbuster it's possible to drop the line, split the load, even dump the load—up to 14.4 kv.

Here's how it works. The SM-4 Power Fuse is equipped with an attachment hook to accommodate Loadbuster. Just hook Loadbuster onto this hook and into the pull ring, pull fuse open and the circuit is interrupted. Result: full load switching at full voltage with no arcing, no contact burning. In one device you get full switching and isolation as well as fault protection.

The key to the Loadbuster system of universal, low cost load switching? Portability! . . . bringing the interrupting device to the power fuse, disconnect, or cutout only when it's needed. In this way the cost of Loadbuster is spread over all the fuses, disconnects, and cutouts on the distribution system.

For more information contact S&C Electric Company, 4421 Ravenswood Avenue, Chicago 40, Ill. We will be glad to give you a demonstration of how Loadbuster works.

S&C ELECTRIC COMPANY

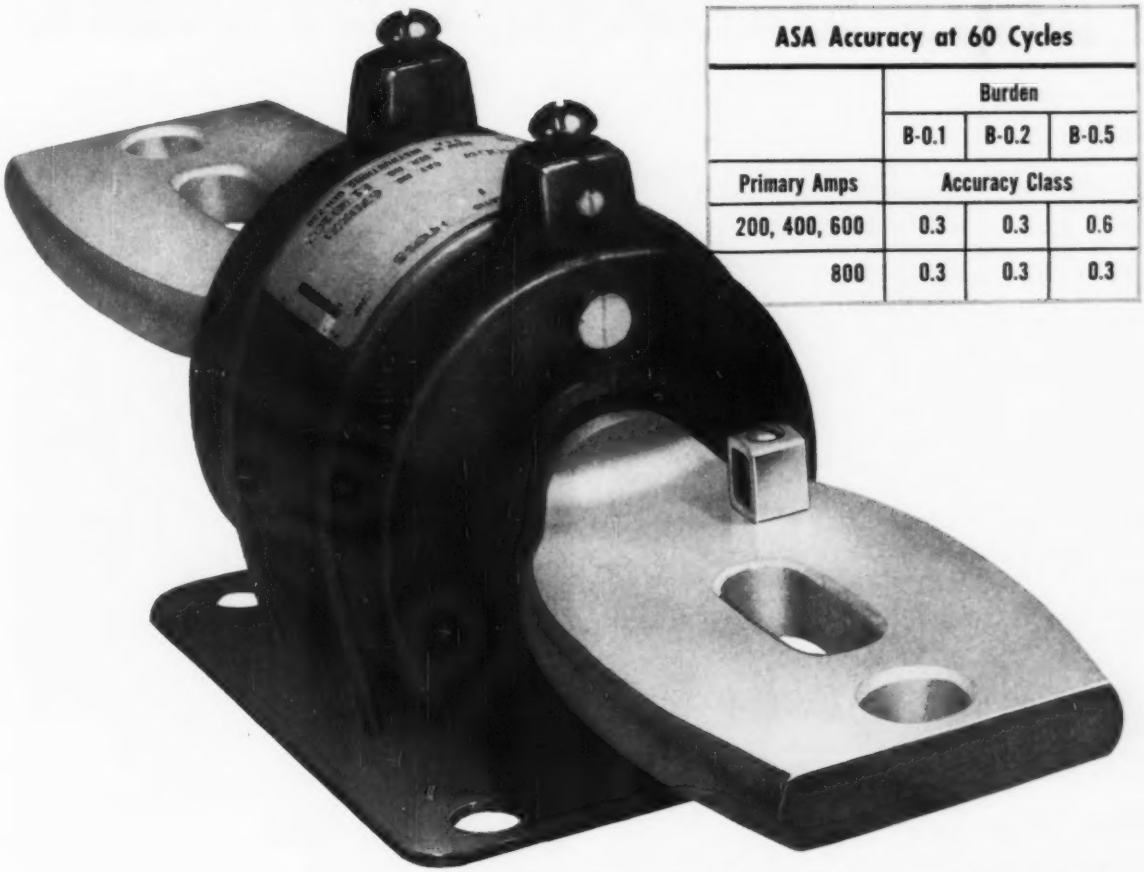
S&C

SAVE UP TO 40% ON NEW INDOOR CURRENT

JCX-0 line available in 200, 400, 600, and 800:5-ampere ratings

A full line of low-priced, miniature, indoor current transformers is now available from the General Electric Company. Designated "Type JCX-0," the new, butyl-molded units are available in 200, 400, 600, and 800:5-ampere ratings, with non-removable primary bar. Design simplification and standardization in the JCX-0 line permit prices as much as 40% below those for equivalent indoor-outdoor transformers. Specifically for indoor use, all JCX-0 transformers carry a new, grain-oriented, silicon-steel core

GENERAL ELECTRIC BUTYL TRANSFORMERS



ASA Accuracy at 60 Cycles			
	Burden		
	B-0.1	B-0.2	B-0.5
Primary Amps	Accuracy Class		
200, 400, 600	0.3	0.3	0.6
800	0.3	0.3	0.3

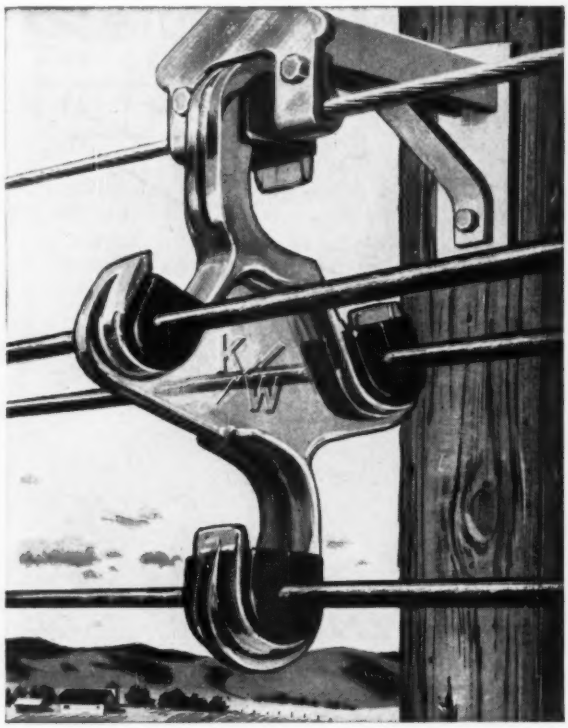
800:5-amp General Electric Type JCX-0 Current Transformer (actual size)

having a saturation point considerably above that of cores used in standard indoor-outdoor models. **FOR MORE INFORMATION** on General Electric's complete, new line of JCX-0 current transformers, contact your G-E apparatus salesman. Or, write General Electric Company, Section 629-4, Schenectady 5, N. Y.

Progress Is Our Most Important Product

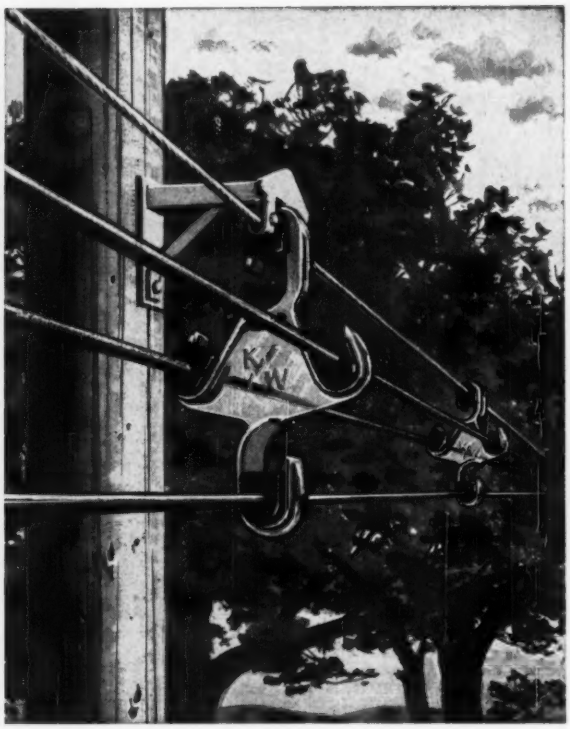
GENERAL ELECTRIC

NEW K/W SPACER TYPE AERIAL ADDS STRENGTH, CUTS COSTS,



One-Piece Design—Supports 1200 Pounds

New solid spacer design has no loose parts nor movable pieces . . . it's simple, reliable and strong. Can support a minimum distributed load of 1200 pounds. Easy to install, since only one conductor is handled at a time. Snap-in grommets shaped to ease installation. Can be used with or without crossarms; standard hardware available from many suppliers.

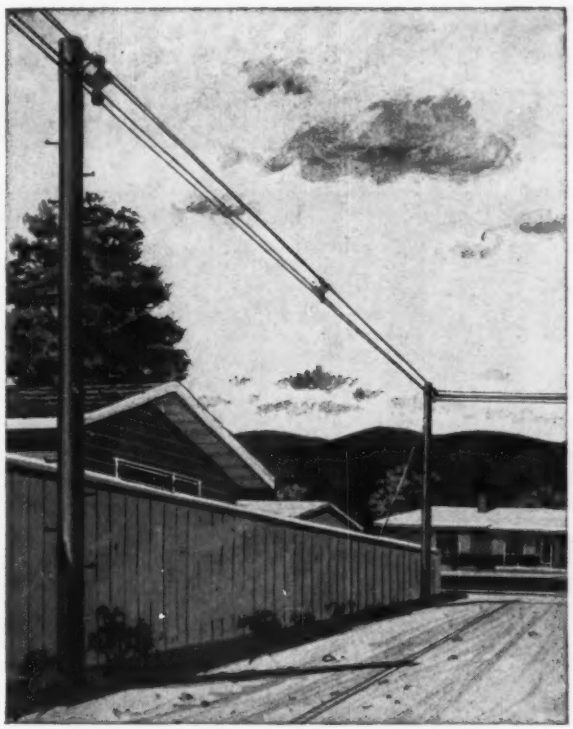


Cuts Material Costs and Tree Trimming

A KW Spacer Cable system can be installed for as little as one half the cost of standard pre-assembled aerial cable!

Compared to open-wire weatherproof, the reduced tree trimming and improved system dependability resulting from messenger supported cables can justify the spacer system's slight additional cost.

CABLE SYSTEM IMPROVES APPEARANCE



Reduced Spacing Improves Appearance

Compared to open wire, closely spaced conductors present a neat, compact arrangement that improves appearance wherever it is installed. Close 6-inch spacing also improves system electrical characteristics . . . permits easy phase identification and proper load balancing. Usual installation practice is approximately 35 spacers per 1000 feet.

WITH its unique new spacer design, KW now offers you unsurpassed dependability and handling ease for cable systems operating at 5 to 15 kv, by using only one spacer for the whole range of voltages.

No tools or tightening necessary: entire spacer system snaps in and locks.

The system consists of four parts: (1) Phase conductors (EC grade aluminum, minimum conductivity 62 per cent, insulated with Polyethylene or Butyl rubber with Neoprene jacket); (2) Special high-strength messenger; (3) Molded one-piece spacers; (4) Molded Neoprene cable-retaining grommets.

Standard hardware is available from leading suppliers. Call your Kaiser Aluminum sales office or KW distributor for immediate service and full information.

Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California.

KAISER ALUMINUM

"IF IT CARRIES CURRENT, KW CARRIES IT!"

See "MAVERICK" • Sunday Evenings, ABC-TV Network • Consult your local TV listing.

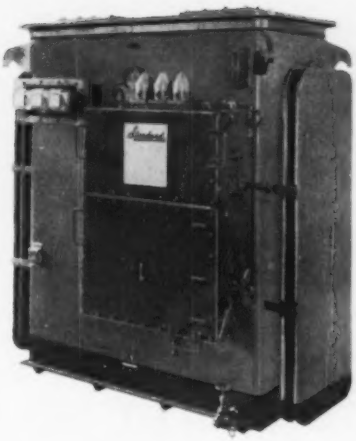
all new...
FROM STANDARD

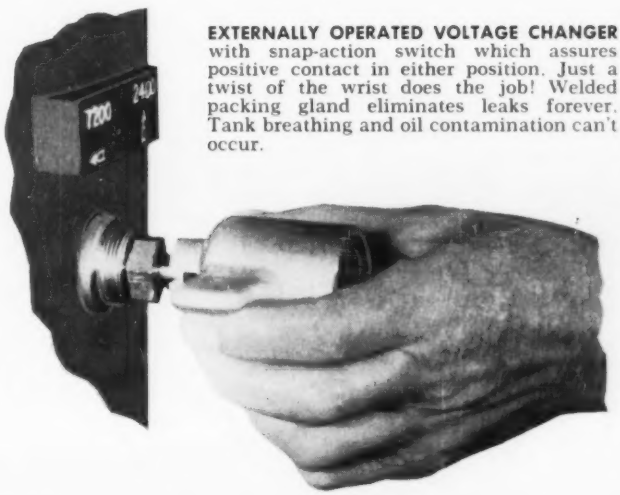
400 VERSATILE PAD-MOUNTED Standard Transformers have completed two years of field service—more than any other unit of this type. Power and distribution units are available now. They permit all underground wiring, blend into natural surroundings and install in minutes!

SWA DISTRIBUTION transformers slash copper losses a dramatic 30%, drop impedance to reduce voltage drops and handle greater overloads without excessive heating. New efficiency is sufficient to pay for cost of the transformer! A Standard first. Ask for Bulletin S-401-C.

PAD-MOUNTED units can be equipped as you specify. High voltage side is protected by an inside door. Performance features match those of low-loss pole-type SWA units.

PANCAKE RADIATORS permit greater capacity in less space at no loss of efficiency. Maximum cooling, extra copper and steel mean lower losses, better regulation, and increased thermal capacity. It all adds up to increased revenue for you. Ask for Bulletin S-402-A.





EXTERNALLY OPERATED VOLTAGE CHANGER with snap-action switch which assures positive contact in either position. Just a twist of the wrist does the job! Welded packing gland eliminates leaks forever. Tank breathing and oil contamination can't occur.

SWA units stay on the job longer before changeout. They carry more load before they pass the 3% voltage drop danger line. Identical cost-cutting, revenue-building features are now built into ALL Standard transformers.

It's nice to be first and it takes a lot of ingenuity to do it. Standard development engineers have pioneered the advances depicted here in less than a year. Other innovations and advances aimed at decreasing your operating costs will come soon. Watch for them.

Good transformer design and use necessitates matching transformers to specific duty and conditions. As loads increase, efficiencies decrease. But if you're protected with units designed to meet and aid your progress, system growth need not be a problem. Consult your nearby Standard representative. He can help you plan ahead by showing you how the extra capacity built into every Standard unit builds sufficient revenue to amortize the transformer cost.

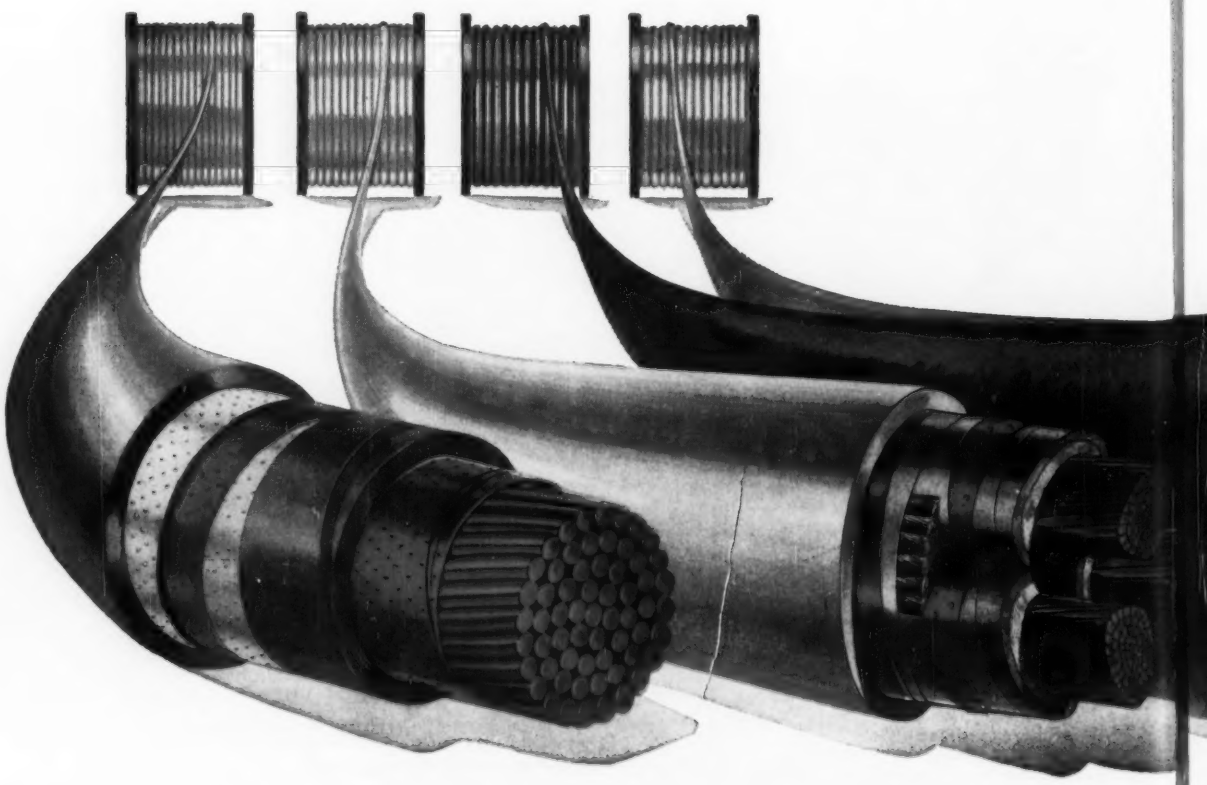
40 years of concentration on transformer design exclusively

Phone WARREN EXpress 2-1563

Standard Transformer CO.
WARREN, OHIO
"WHEREVER THERE IS POWER"

FOR THE MOST EFFICIENT
POWER DISTRIBUTION . . . SPECIFY

PAPER-INSULATED CABLES BY PHELPSD



Single conductor, 1 KV and up

Three-conductor, 1 KV and up

PSDODGE!

Phelps Dodge paper-insulated power cables have a *demonstrated record* of long life in a great variety of designs for all types of applications—underground duct, direct burial, submarine and aerial.

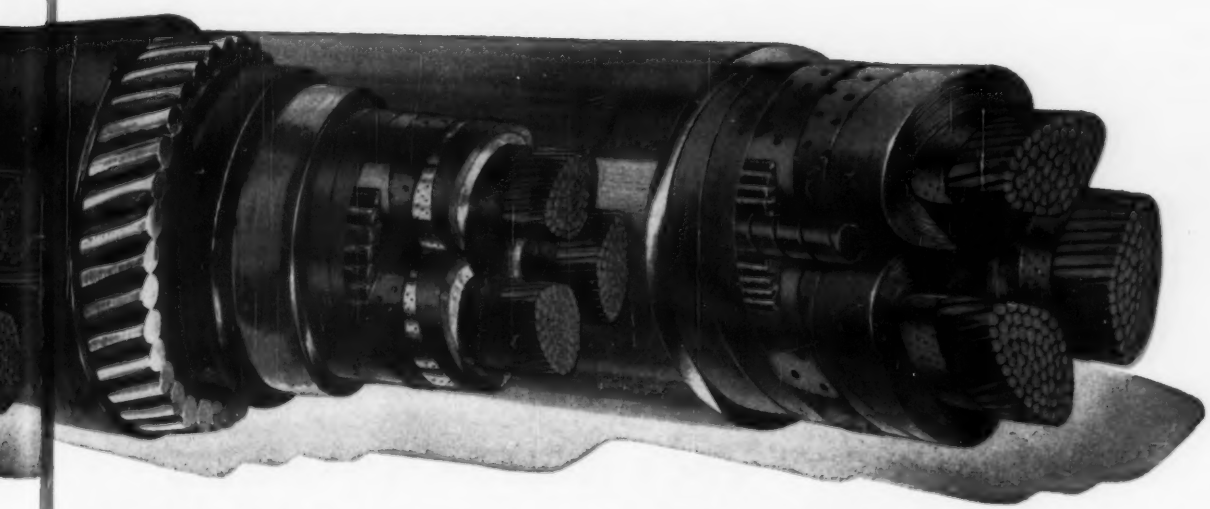
Paper-insulated cables have these important inherent characteristics that improve operating performance and lengthen service life:

- Extra high 60-cycle and impulse strength to withstand switching and lightning surges.
- Ability to handle large blocks of power in single cables of minimum dimensions.
- Positive protection against all contaminations, due to being hermetically sealed in an extruded metallic sheath.

Paper-insulated cables can be supplied with either lead or aluminum sheaths.

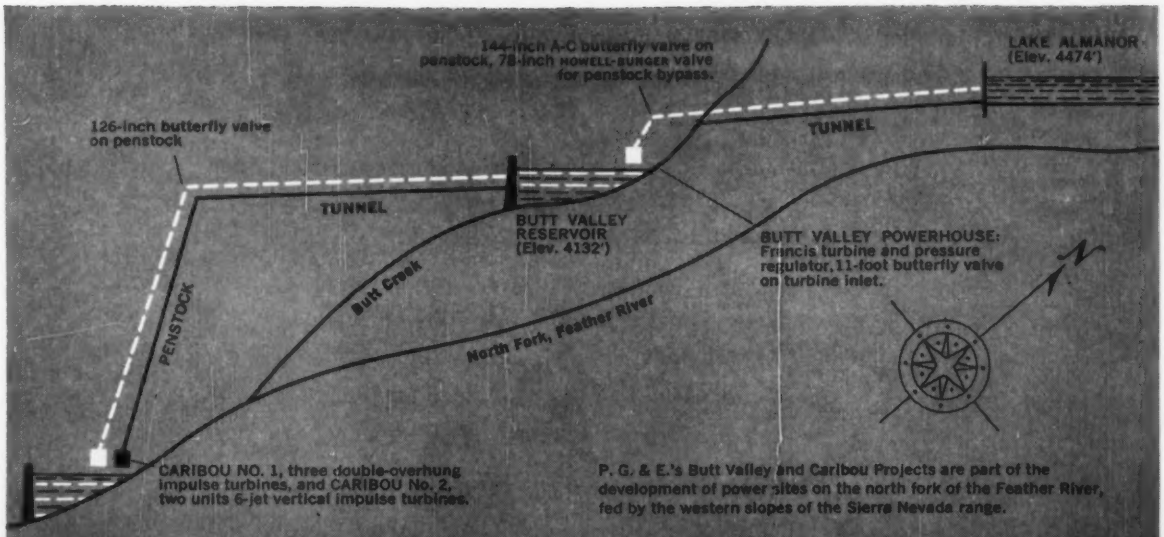
Phelps Dodge offers the widest range of high voltage cables to the electrical industry.

PHELPS DODGE COPPER PRODUCTS
CORPORATION
300 PARK AVENUE, NEW YORK 22, NEW YORK

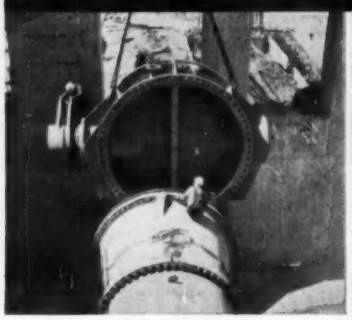


Submarine, 1 KV and up

Low-Pressure gas-filled, 8 KV and up

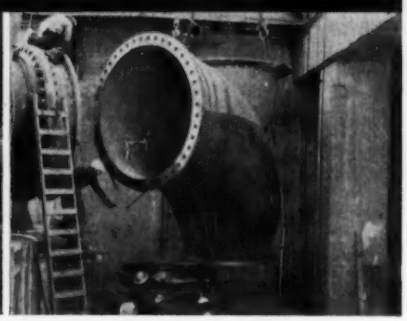

144-inch A-C butterfly valve on penstock, 78-inch HOWELL-BUNGER valve for penstock bypass.
LAKE ALMANOR (Elev. 4474')
126-inch butterfly valve on penstock
TUNNEL
TUNNEL
BUTT VALLEY RESERVOIR (Elev. 4132')
BUTT VALLEY POWERHOUSE: Francis turbine and pressure regulator, 11-foot butterfly valve on turbine inlet.
PENSTOCK
Butt Creek
North Fork, Feather River
CARIBOU NO. 1, three double-overhung impulse turbines, and CARIBOU No. 2, two units 6-jet vertical impulse turbines.
P. G. & E.'s Butt Valley and Caribou Projects are part of the development of power sites on the north fork of the Feather River, fed by the western slopes of the Sierra Nevada range.

The 11-foot butterfly valve on the Butt Valley turbine inlet is shown being lowered into position.



Turbine spiral case in position at Butt Valley prior to the installation of the turbine runner.

Pressure regulator inlet elbow being positioned. Spiral case is at the left and energy absorber and discharge chamber below.



Allis-Chalmers Turbines, Pressure Regulator and Valves Installed at Butt Valley and Caribou Powerhouses, No. 1 and No. 2.

At Pacific Gas & Electric Company's new Butt Valley Powerhouse development, an Allis-Chalmers vertical Francis turbine with pressure regulator, two butterfly valves and one HOWELL-BUNGER valve are installed. This turbine is rated at 55,000 HP at 200 rpm under a 280-foot rated head.

A stalling-type pressure regulator, with provision for quick and simple conversion to synchronous bypass control, it's attached to the spiral case. Designed for a minimum opening time of 3 seconds, the pressure regulator is required because of the 5703-foot long penstock and the relatively remote location of the surge tank. An 11-foot A-C butterfly valve is located at the turbine inlet, while the other butterfly valve will be used as a penstock shutoff valve. The HOWELL-BUNGER valve serves as a penstock bypass.

Down stream from Butt Valley is Caribou No. 1 Powerhouse, with 3 Allis-Chalmers horizontal, double-overhung impulse units, 30,000 HP each, two units paralleled 1921, the third unit paralleled 1924, and Caribou No. 2 Powerhouse, completed along with Butt Valley in 1958. Caribou No. 2 has two Allis-Chalmers vertical, 6-jet impulse turbines, each rated 76,000 HP at 1110-foot head at 240 rpm. At each turbine inlet is a 54" rotary valve of latest Allis-Chalmers manufacture.

You can look to Allis-Chalmers for the latest in design, engineering and manufacturing of a complete line of hydraulic turbines and their accessories. For further information, contact your local Allis-Chalmers office or write Allis-Chalmers, Hydraulic Division, York, Pa.

HOWELL-BUNGER and ROTOVALVE are Allis-Chalmers trademarks

Hydraulic Division RESEARCH DESIGN HYDRODYNAMICS ENGINEERING FABRICATION

ROTOVALVE • Ball Valves • Butterfly Valves • Free-Discharge Valves
Hydraulic Turbines & Accessories • Pump-Turbines • Pumps • Liquid Heaters

AC ALLIS-CHALMERS

1106

experience

keeps BICC *in the lead*

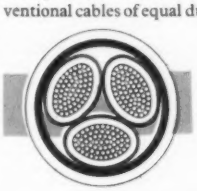
Being the World's greatest cablemakers is not just a matter of size.
It's also, generally speaking, a case of knowing more than the other guy.
The experience gained from making BICC cables and accessories for every electrical purpose has helped us pioneer many developments in our field.

This 138 kV submarine cable had to be 16 miles long
–unjointed!

The power link between the British Columbia mainland and Vancouver Island required more than 133 miles of 138kV single-conductor submarine cable, including seven 16 mile lengths — each without a single joint. Making such unjointed lengths of cable was considered to be 'impossible' in the electrical world. But BICC made and laid them with conspicuous success. Altogether some $10,000,000 of power cable contracts have been placed with BICC by the British Columbia Electric Company Ltd.

D.S.O. FOR ECONOMY

The Ductless Shaped-conductor Oil-filled cable is BICC's latest development in 33kV transmission. Dispensing with fillers and built-in ducts, it costs less than conventional cables of equal duty.



CABLES FOR THE FIRST NUCLEAR POWER STATION

BICC supplied cables and accessories for Calder Hall, England, the first nuclear power station in commercial operation. The cables include specially designed types resistant to intense radiation and heat, for operating the fuel charging and discharging grabs.

330,000 VOLT CABLE FOR KARIBA

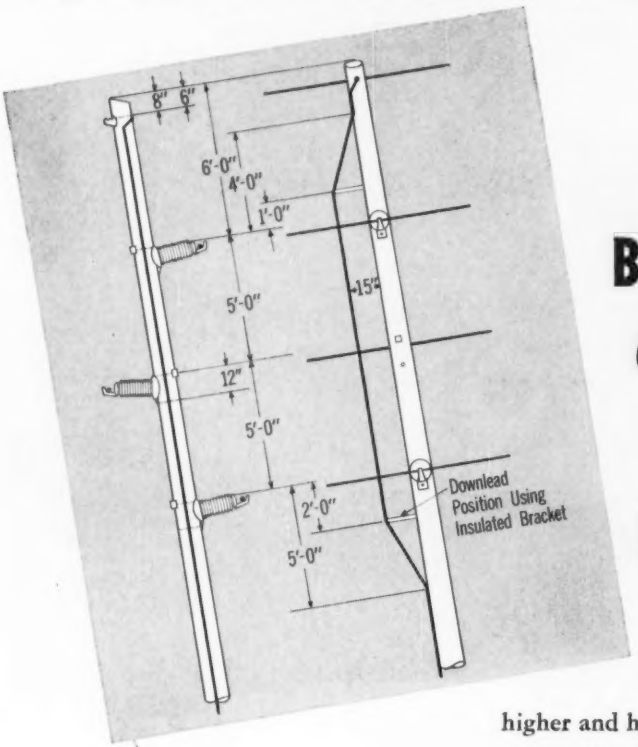
The Kariba dam is being built on the Zambesi river to provide hydro-electric power for Central Africa.

Transmission equipment for this project is being manufactured by BICC. Altogether orders for this company total some ten million dollars and include a specially designed 330,000 volt single-conductor oil-filled cable which will connect the underground power house to the overhead transmission lines. This will be the highest voltage cable ever installed in Africa.

BICC **the World's largest cablemakers**

BRITISH INSULATED CALLENDER'S CABLES LIMITED
Technical Representative in U.S.A., Arthur F. Coventry, 11 West 42nd Street, Suite 442, New York 36, N.Y.

IMPORTANT COST REDUCTION IN TRANSMISSION LINE CONSTRUCTION



Build this 69 kv transmission line with only 7 bolts per structure

Here is a line design that reduces the labor component of construction cost. Good news for builders that find labor factors higher and higher!

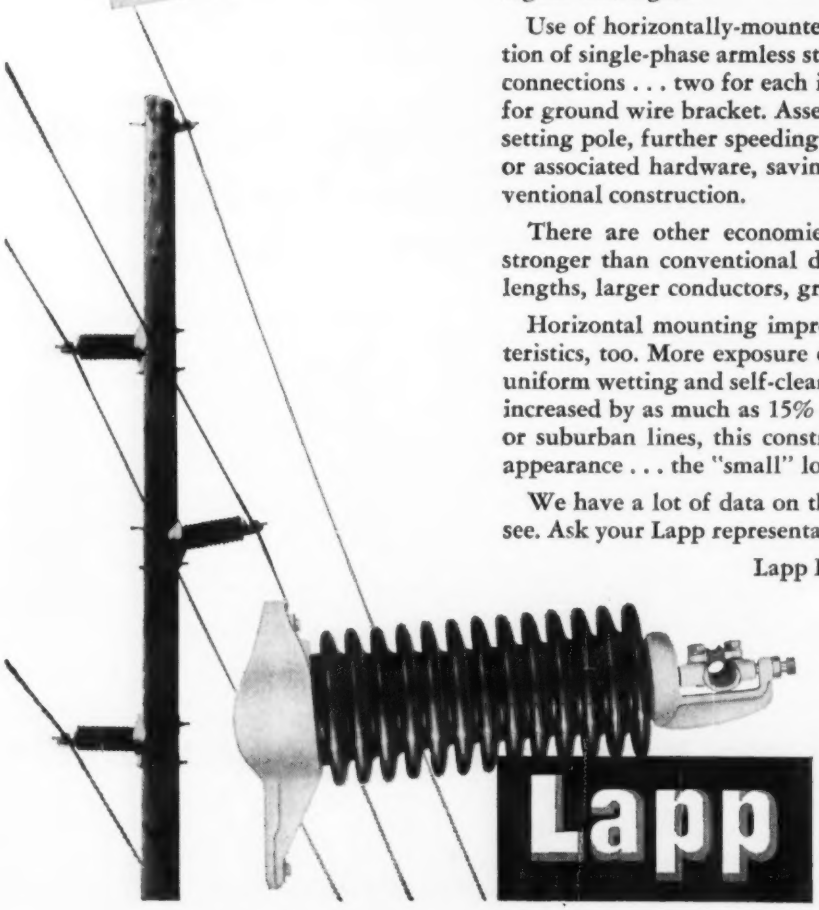
Use of horizontally-mounted Lapp Line Posts permits erection of single-phase armless structures, with only seven bolted connections . . . two for each integral-gain-base insulator, one for ground wire bracket. Assembly is done before raising and setting pole, further speeding erection. Without arms, braces, or associated hardware, savings are an actual 25% over conventional construction.

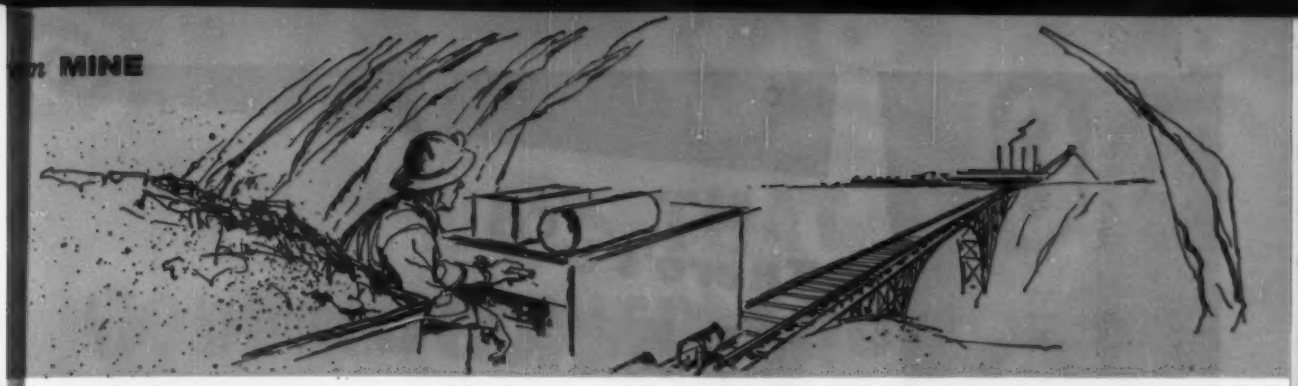
There are other economies also. Armless structures are stronger than conventional designs, permitting greater span lengths, larger conductors, greater factors of safety.

Horizontal mounting improves insulator electrical characteristics, too. More exposure of insulator surfaces encourages uniform wetting and self-cleaning . . . wet flashover values are increased by as much as 15% over upright ratings. For urban or suburban lines, this construction offers trim, unobtrusive appearance . . . the "small" look of a distribution line.

We have a lot of data on this construction that you should see. Ask your Lapp representative or write:

Lapp Insulator Co., Inc., Le Roy, N. Y.





ONE SURE SOURCE OF SUPPLY

for all your wire and cable needs

Quality products, ample stocks, dependable deliveries—that's what you get when you work through a Circle distributor.

Quality products—because Circle controls every step in manufacturing—from the copper, lead, and zinc mined and refined by Cerro de Pasco down to the finished wire and cable—

Ample stocks—because Circle is one of the country's largest producers with over a billion feet of quality building wire and cable rolling out of its huge plants yearly—

All-out service—because that's a basic policy at Circle, a policy which has earned Circle its reputation for giving fast, friendly, dependable service where and when it's needed.

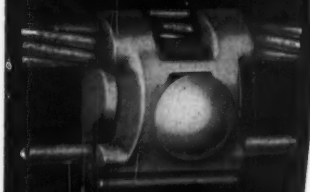
Why don't *you* make a Circle distributor your "one sure source of supply." Many other satisfied contractors do.

C W C **CIRCLE** **WIRE & CABLE**
a subsidiary of
CERRO DE PASCO CORPORATION

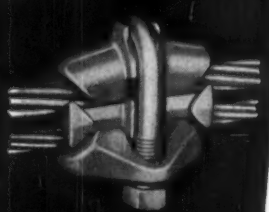
PLANTS: Maspeth and Hicksville, N. Y. **SALES OFFICES & WAREHOUSES:** in all principal cities

RUBBER COVERED WIRES & CABLES • VARNISHED CAMBRIC CABLES • PLASTIC INSULATED CABLES
NEOPRENE SHEATHED CABLES • "CIRTUBE" EMT

Type AAW

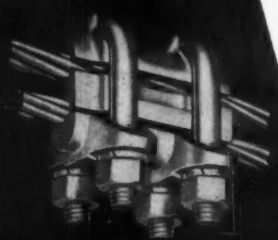


Type PAA



Type DLC

Type W



Type 2U AA

Type PAA 400

There's a BLACKBURN clamp for every ALUMINUM CONNECTION

Always Use Blackburn Aluminum Fittings When Terminating or Joining Aluminum Conductors

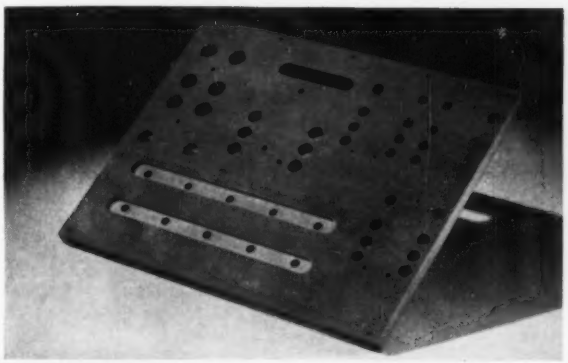
- Each clamp accommodates a wide range of conductors.
- Castings are high-strength, corrosive-resistant, heat treated aluminum alloy.
- Blackburn special surface treatment eliminates production oxides and improves conductivity.
- Bell contoured grooves protect conductors. Clamping forces are distributed over extra-large contact area.
- Available with galvanized steel or aluminum hardware. Aluminum hardware is alumilited to prevent seizing.
- Can be quickly and easily installed with regular linemen's equipment. No special tools required.

IMPORTANT: We recommend the use of CONTAX on all aluminum connections. CONTAX is an oxide inhibiting compound with an ASTM drop point of 549° F.

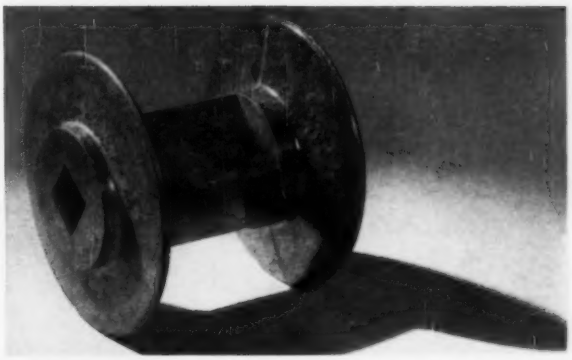
BLACKBURN *Aluminum* FITTINGS

JASPER BLACKBURN CORPORATION
1525 Woodson Rd., St. Louis 14, Mo.,
Wydown 3-9430

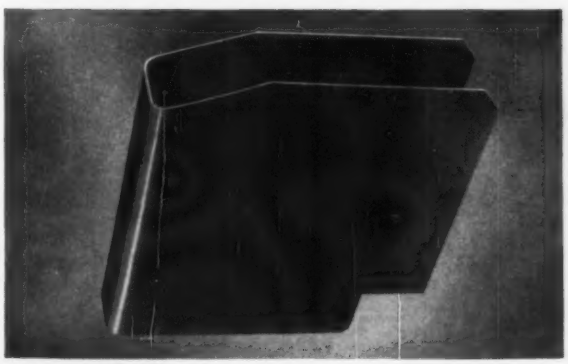
FOUR WAYS THAT MODERN POWER EQUIPMENT BENEFITS FROM CDF INSULATION KNOW-HOW



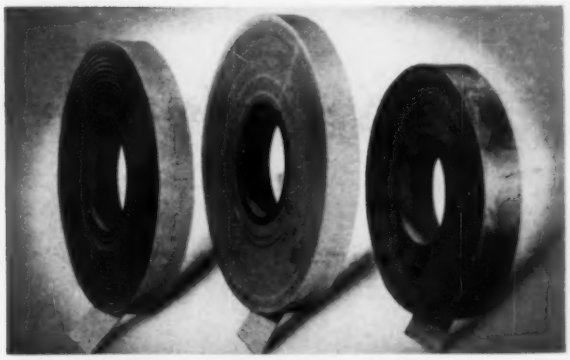
CDF **UNDERSTANDS THE ELECTRICAL INDUSTRY'S NEEDS.** Equipment designers can often save space with dependable CDF insulating parts, developed for each specific power application. This, for example, is a Dilecto® panel board.



CDF **OFFERS UNIQUE MATERIALS.** This contact shaft for an air circuit breaker is a typical example of CDF Celoron® used in switchgear because of its very high impact strength. Celoron is CDF's molded phenolic material, highly adaptable and rugged.



CDF **USES MODERN METHODS.** Large quantities of arc-chute barriers are made from paper-base, flame-retardant Dilecto laminates. Operations on these parts include pressing, cutting, post-forming, and trimming.



CDF **MAKES INSULATING TAPES** of DuPont TEFLON TFE fluorocarbon resin, both glass-supported and unsupported; also flexible tapes of silicone rubber and CDF Micabond® for high-heat applications.

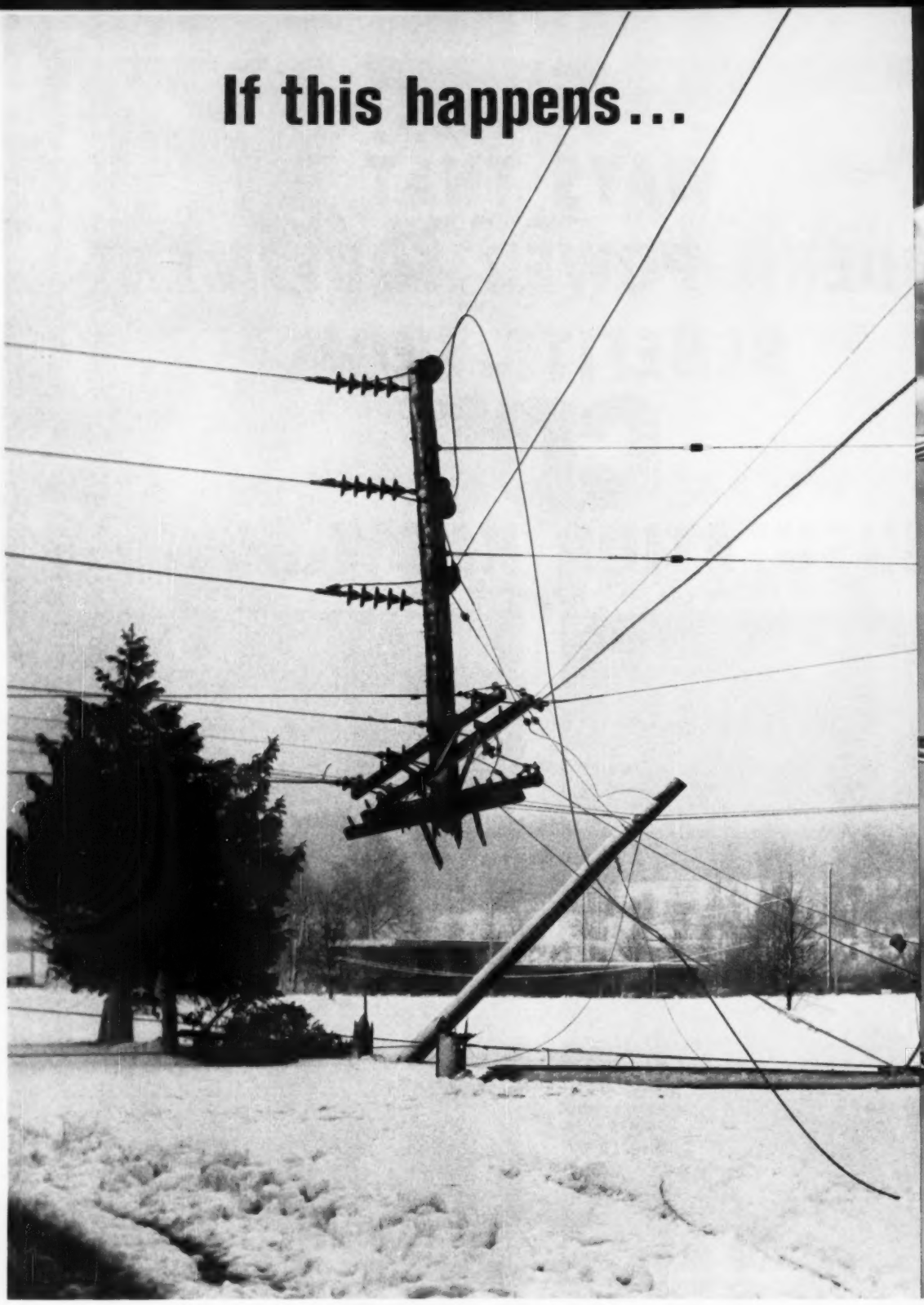
LOOK FOR CDF in Sweet's Product Design File. Send us your print or your problem, and we'll return recommendations for your particular needs.

CONTINENTAL-DIAMOND FIBRE

A SUBSIDIARY OF THE Budd COMPANY • NEWARK 15, DEL.

In Canada: 46 Hollinger Road, Toronto 16, Ont.

If this happens...



You can look up to **Preformed**™

FOR FAST, EMERGENCY SHIPMENTS

Call Cleveland, EXpress 1-3571
or wire "Preformed Cleveland"

For fast, simple, tool-free PERMANENT Repair and Maintenance use *Preformed*™

ARMOR SPLICES

Winter aggravates concentrated clamp stresses at suspension points. Repair existing damage before Winter hits; and guard against future damage from arc over and vibration.

LINE SPLICES

You get line failures when temperature cycling and icing loosen chuck jaws or bolted fittings. Make a fast, sure connection by repairing with Preformed Flexible Splices . . always compatible with the conductor.

PATCH RODS

Rapid repair of damage to conductors (not exceeding 25% of the outer layer of cable) is best accomplished with Preformed Patch Rods which will restore full mechanical strength and electrical conductivity.

Patented — U.S. Patent No. 2,679,653; other ... pending

SPLICE SHUNTS

When moisture pockets cause internal corrosion and overheating, failure of the joints may result. To restore full electrical conductivity and mechanical strength, wrap on a Preformed Splice Shunt over the malfunctioning splice.

PREFORMED LINE PRODUCTS COMPANY
DEPT. SP-3
5349 St. Clair Avenue, Cleveland 3, Ohio

WHEN FIRST COST IS IMPORTANT "BUFFALO" RADIAL WHEEL FANS

"Buffalo" Type "CR" Radial Wheel Fan

"Buffalo" Radial Wheel Fans combine the low cost advantages of this type design with the highest efficiencies possible with a radial blade wheel. This is a great advantage in applications suited to this fan. These include stoker-fired or pulverized coal boilers. The "CR" is also widely used for handling air with dust loadings in many industrial jobs.

The "CR" combines sharply rising pressure and horsepower characteristics with high static efficiency. Ruggedly-built, it gives long, trouble-free performance under severe conditions. The high pressure and capacity of this fan often permit use of a smaller unit for many direct-connected applications. This results in further first cost savings.

For dependable, stable radial wheel fan performance, investigate the "Buffalo" Type "CR" Fan. It's designed for both constant volume or inlet-dampered operation. Write for full information in Bulletin FD-205.

"Buffalo" manufactures a complete line of Mechanical Draft Fans. Included are airfoil and backward-curved designs, with a broad choice of wheels. For details on the full line, call your nearby "Buffalo" engineering representative. Or write us direct for Bulletin FD-905.

BUFFALO FORGE COMPANY
Buffalo, N. Y.
Buffalo Pumps Division, Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

KELLOGG ENGINEERS

BUILD LONG LIFE

INTO POWER PLANTS

With costs of downtime constantly climbing, the soundest investments in new central stations today are those engineered for optimum protection against failure tomorrow.

This is one of the reasons why The M. W. Kellogg Company, worldwide engineers and builders of plants for basic industries, is so frequently charged with the execution of large capital expenditures by electric utilities—one industry vital to all.

In central stations functioning 24 hours every day, a major Kellogg responsibility is to install and weld the hundreds of feet of heavy-walled main steam lines that keep steam flowing to the turbines, as well as much of the auxiliary piping.

Through Kellogg's metallurgical background and the company's development of special field-welding techniques, the security of Kellogg K-Welds® on stainless, chromemoly, and high quality carbon steel piping is assured for the life of the steam generating system.

Kellogg's role in the erection of one major utility's newest power station is fully described in the 12-page booklet—"The Eddystone Story." Inquiries for this booklet are invited from consulting engineers, engineers of power generating companies, and manufacturers of boilers, turbines, and allied equipment.

THE M. W. KELLOGG COMPANY

711 Third Avenue, New York 17, N.Y. *A Subsidiary of Pullman Incorporated*

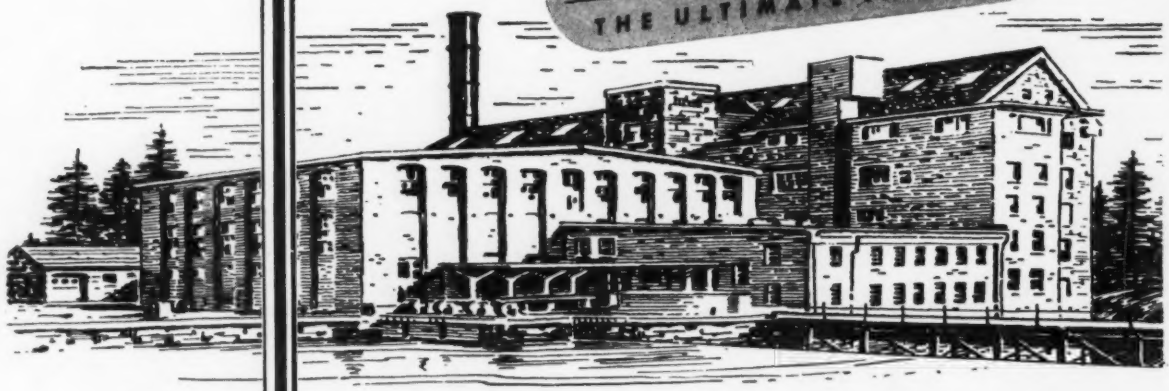
Offices of Kellogg subsidiary companies: Toronto, London, Paris, Buenos Aires, Caracas, Rio de Janeiro

THE ULTIMATE IN MICA

You know that Mica is a natural product—
that it must be processed into usable form—
that who does the processing
and how is important—
When Mica is specified, go all the way
and specify

MACALLEN MICA
THE ULTIMATE IN MICA

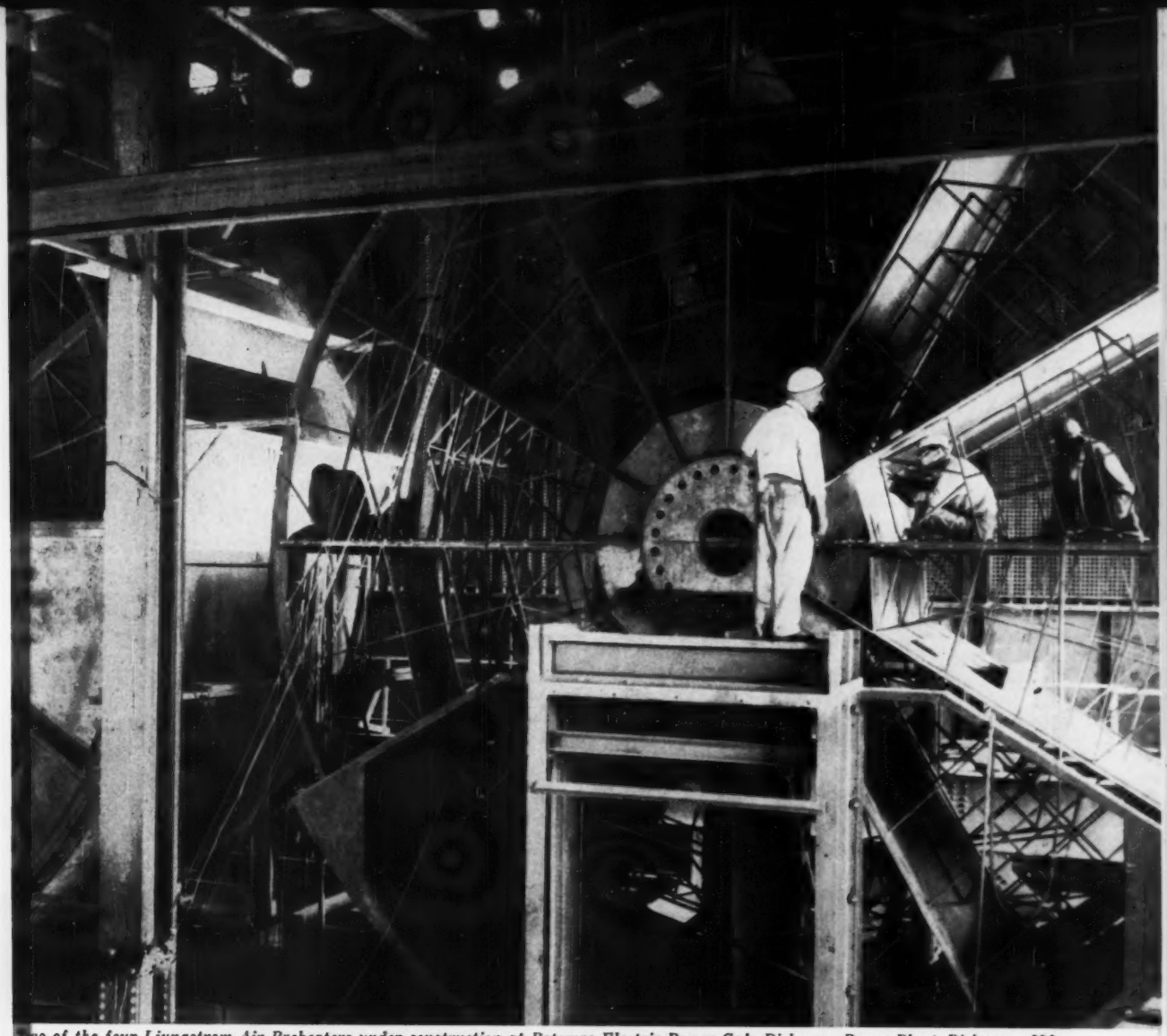
send for Catalog



THE MACALLEN COMPANY, INC.

BAY ROAD
NEWMARKET, NEW HAMPSHIRE

CHICAGO: 565 W. WASHINGTON BLVD.
CLEVELAND: 1231 SUPERIOR AVE.



Two of the four Ljungstrom Air Preheaters under construction at Potomac Electric Power Co.'s Dickerson Power Plant, Dickerson, Md. Each pair of these Ljungstroms, with a combined heat exchange surface of 475,000 sq. ft., will serve one boiler, evaporating 1,300,000 lbs of steam/hr. The first 175,000 KW unit was placed in operation in June this year and a duplicate unit is now under construction.

IR PREHEATER SERVICE
PROTECTS POTOMAC ELECTRIC POWER CO.'s NEW **LJUNGSTROMS®** TWO WAYS

m the moment they start—and as long as they operate—these ngstroms will get double-header Preheater service: protection ast routine wear, and insurance maximum operating efficiency. is how.

time Air Preheater Service pro- regular inspection and the serv- of expert technicians throughout life of each unit. Air Preheater neers make personal calls at least a year on every Ljungstrom llation to make sure that all units are in top condition. This type of service is still in effect on Air Preheaters dating from 1923.

Rapid factory service gives the best possible protection against routine wear, the best insurance of readily-available replacement parts. In one typical case, an Air Preheater customer 500 miles from the factory received *custom-fabricated* parts within ten hours after his initial request for these parts.

Regular inspection and fast response to emergencies are just two advantages Air Preheater offers its customers. Another is expert knowledge of boiler and preheater problems, gained through 35 years' experience. These reasons—knowledge of our customers' problems and a *continuing* interest in them—probably explain why nine out of ten preheaters sold today are Ljungstroms.

THE AIR PREHEATER CORPORATION

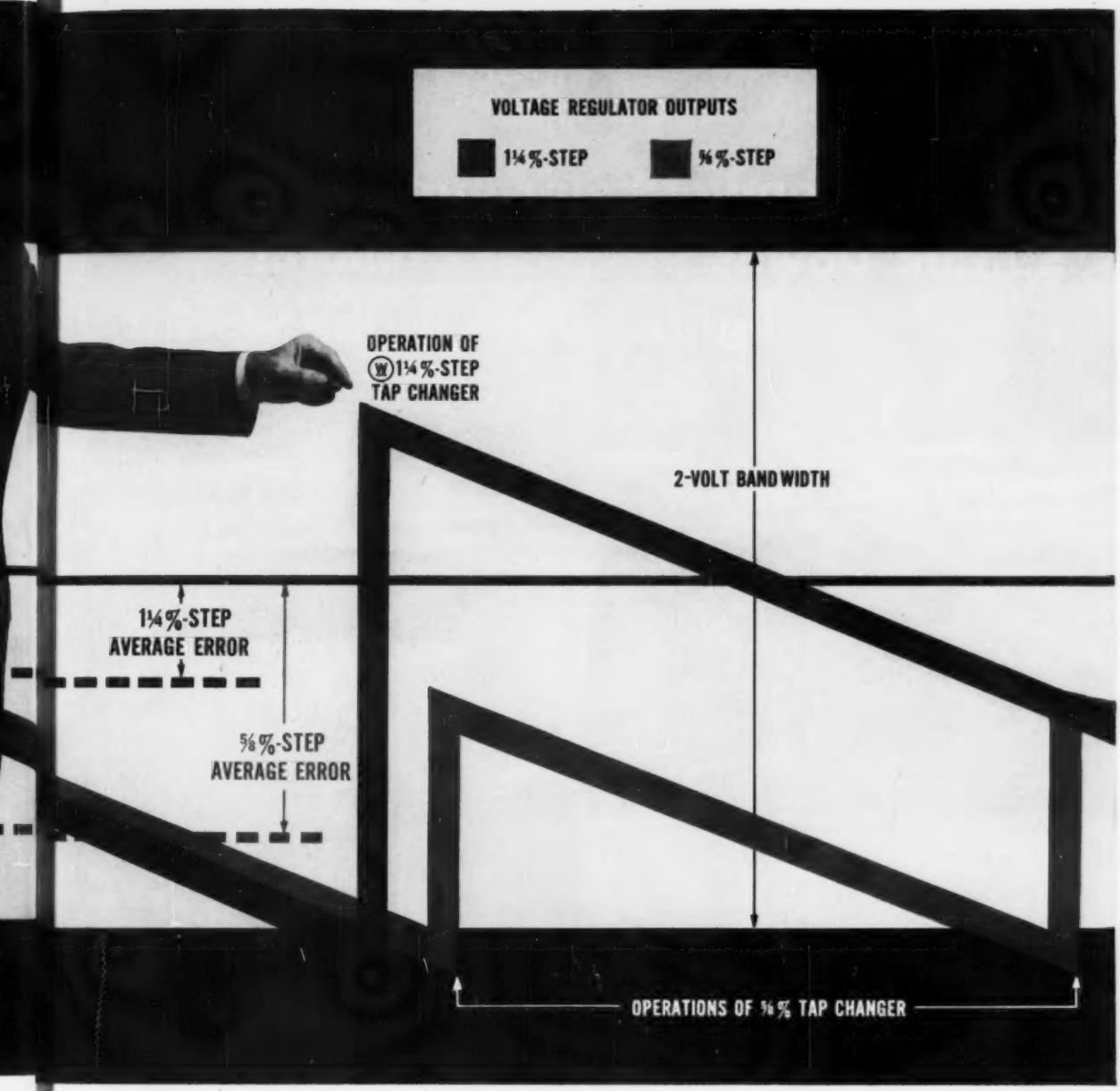
60 East 42nd Street, New York 17, N. Y.

Here's how Westinghouse 1¼%-step regulation provides

Tap changer operations are the key to good system voltage control since no regulating is done until the tap changer operates. For best results, tap changes should be correctly timed and reasonable in number.

With ordinary control schemes, voltage relay bandwidths are often set in such a manner that it becomes necessary to effectively widen the band by adding fixed time delay to prevent an unreasonable number of tap changer operations. Where this is done, regulator output voltage bandwidth may vary widely, depending on the rate and extent of variation of input voltage. But with Westinghouse URL and URF regulators, you set the bandwidth you want and the unique CVR inverse time voltage relay, combined with instant response tap changer, prevents sustained wide voltage variations which are possible with fixed time delay. The result . . . a narrower effective band in the actual output where it counts. As an added benefit, the larger step gives an average voltage closer to midband, as shown in the illustration above.

You can protect your customers against abrupt voltage changes, get narrower effective bandwidths, and achieve better average levels when you use



closer voltage control . . . with fewer operations

Westinghouse 1¼ %-step regulators; and you get longer life with reduced maintenance because fewer operations are required.

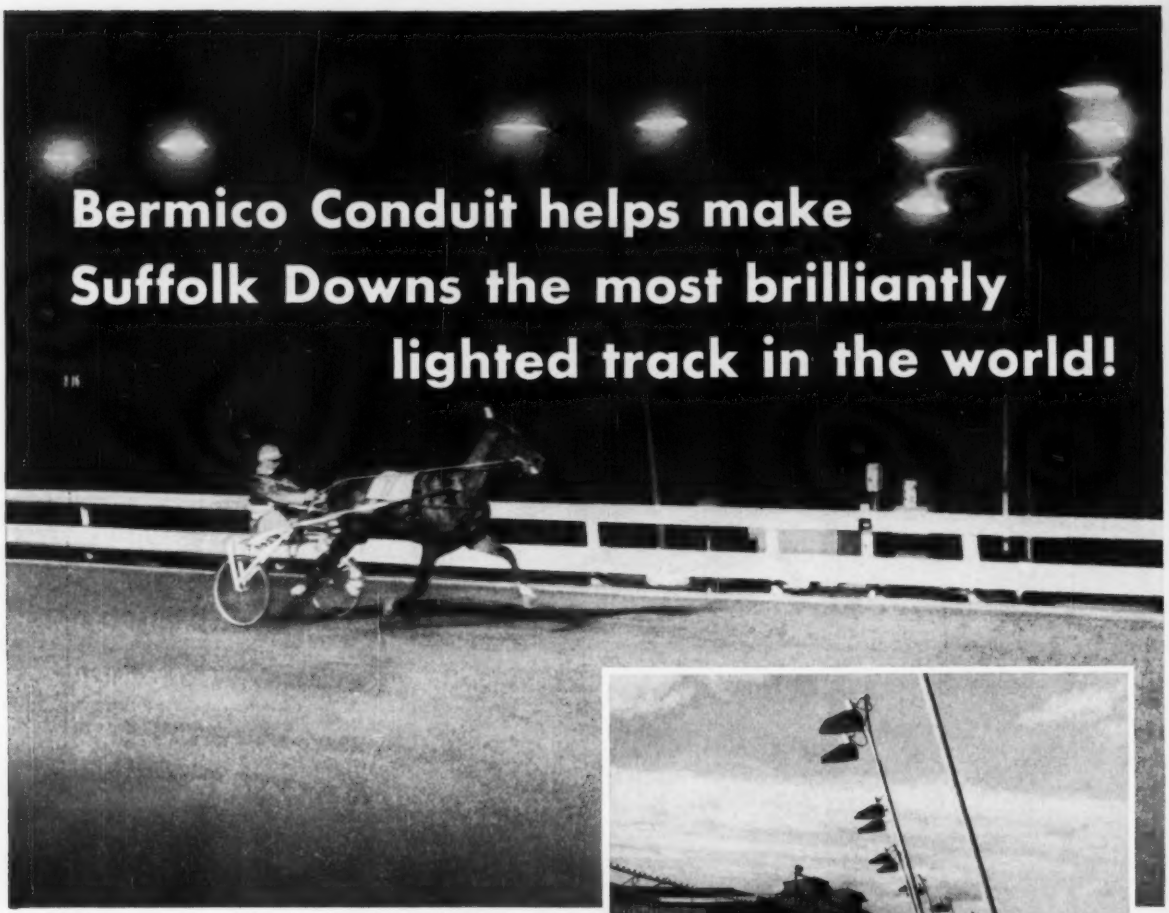
Ask your Westinghouse sales engineer for further details about the bonus values from Westinghouse 1¼ %-step voltage regulators. J-70902

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS CBS TV FRIDAYS

Bermico Conduit helps make Suffolk Downs the most brilliantly lighted track in the world!



Suffolk Downs . . . America's only mile track for night harness racing

Suffolk Downs now leads a double life. It serves as a jockey track by day . . . as a harness track by night.

To equip this 25-year old track for night attendance, 3 miles of Bermico Conduit were used in the backstretch alone. To floodlight the homestretch, 6 miles of Bermico were required. The parking area took another 5 miles of rugged, long-lasting, corrosion-resistant Bermico Conduit.

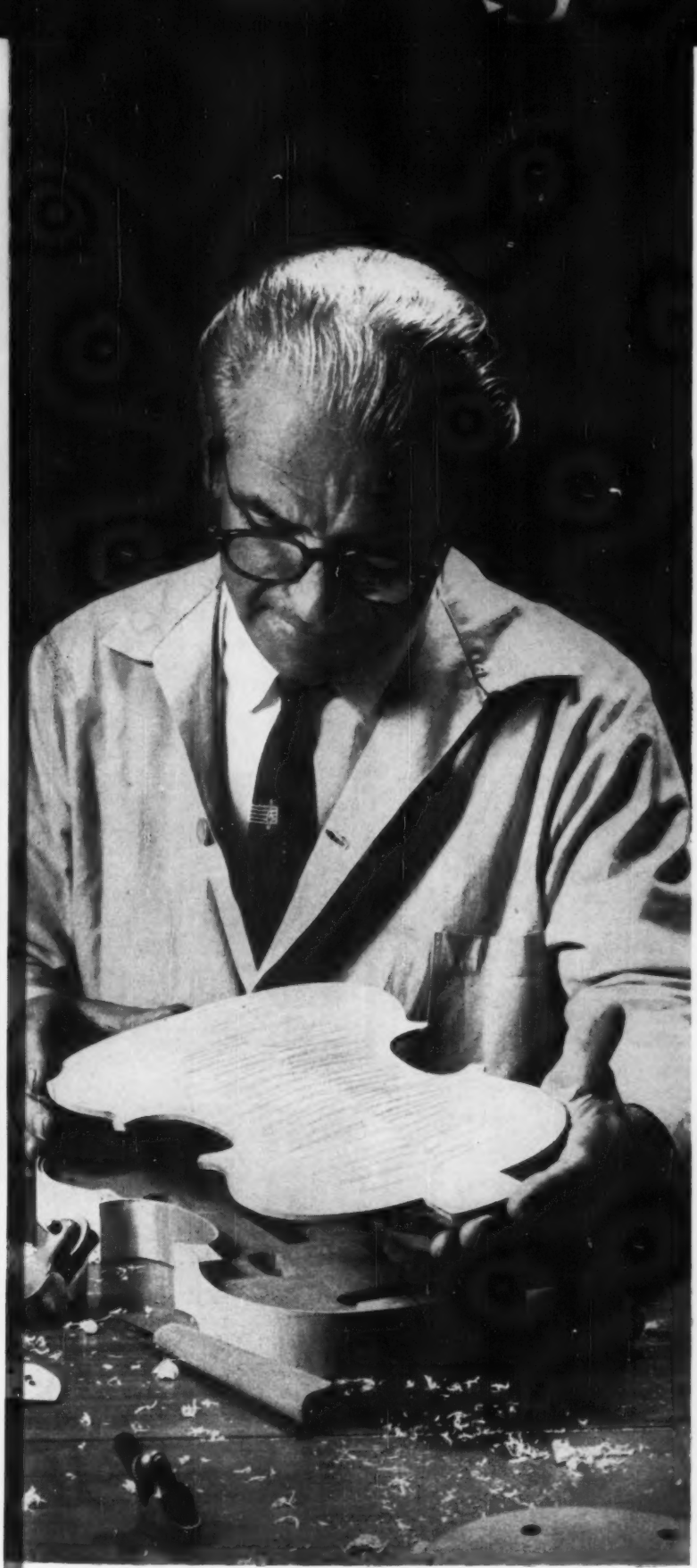
Bermico was selected for this job partly because of the speed and ease with which it can be installed. In a job of this magnitude . . . that is an important economy. Other features that recommend the use of Bermico are its resistance to heat, water, acids and alkalies; its high dielectric strength; its smooth inside bore, which permits easy pull-through without abrasion. Made from cellulose fibre, impregnated with coal tar pitch, Bermico is precision engineered. Try it on *your* next lighting installation.

Arthur S. Hamilton, Jr., Consulting Engineer and M. B. Foster, Electrical Contractors, teamed together in the electrification of this famous horse racing track. Suffolk Downs is conveniently located in Massachusetts' East Boston section.

Another quality product of

BROWN COMPANY

General Sales Office: 150 Causeway Street, Dept. 13119, Boston 14, Mass. *Mills:* Berlin, N. H., Birmingham, Ala., Corvallis, Oregon



"When performance counts," says our artisan friend, "you look for skilled craftsmanship and the best materials. There can be no compromise with quality."

The same thing applies to treated wood products. At AMCRECO no detail is insignificant. Each step—from selection of growing timber to treatment of the wood—is carefully controlled for highest quality.

The results of this exacting care and craftsmanship are reflected in the decades of service-life that AMCRECO-treated structures provide.

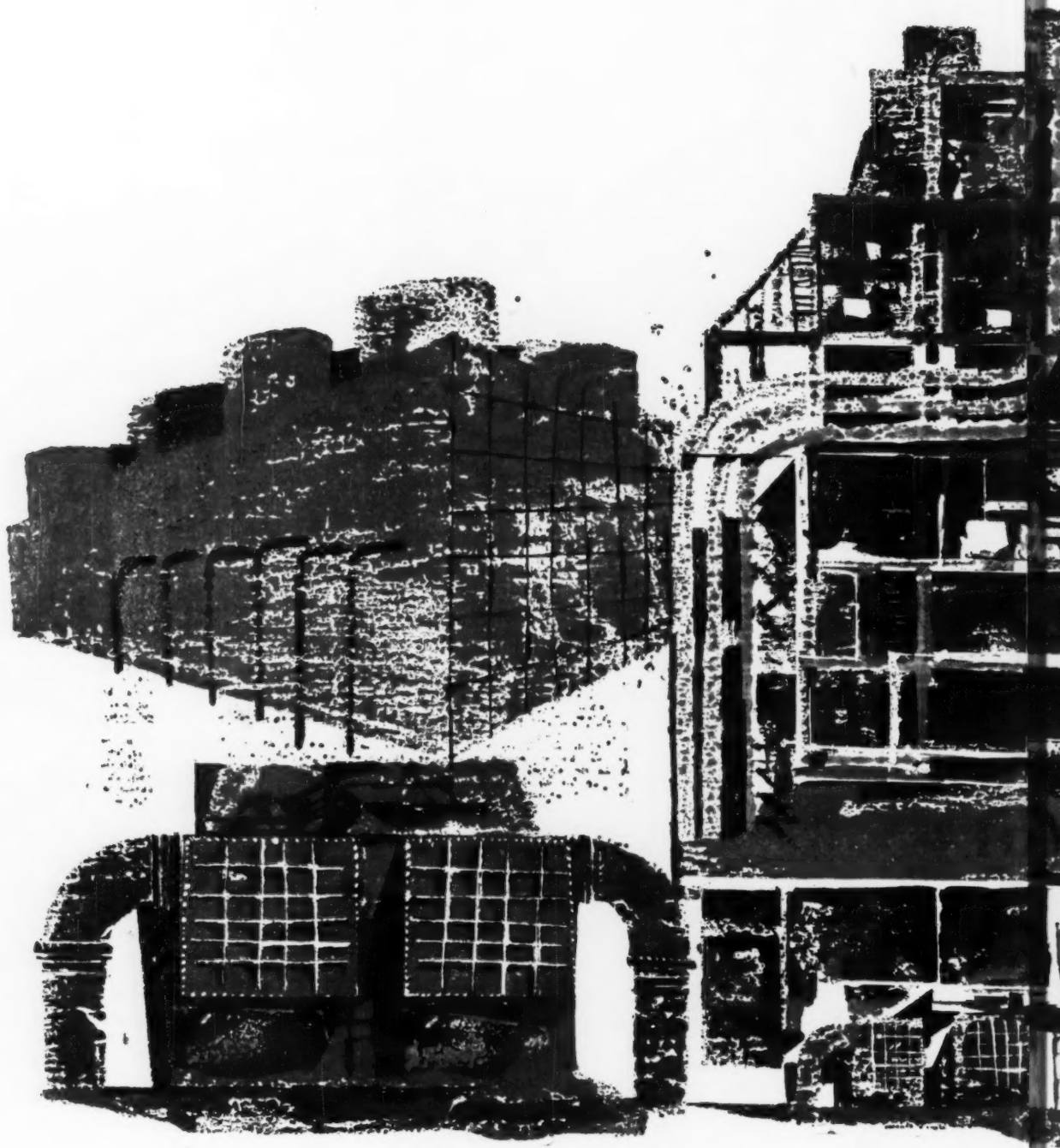
Why not see for yourself how quality control can improve performance, by specifying AMCRECO on your next order for pressure treated wood products.

AMERICAN CREOSOTING CORPORATION

AMCRECO PRESSURE TREATED WOOD PRODUCTS

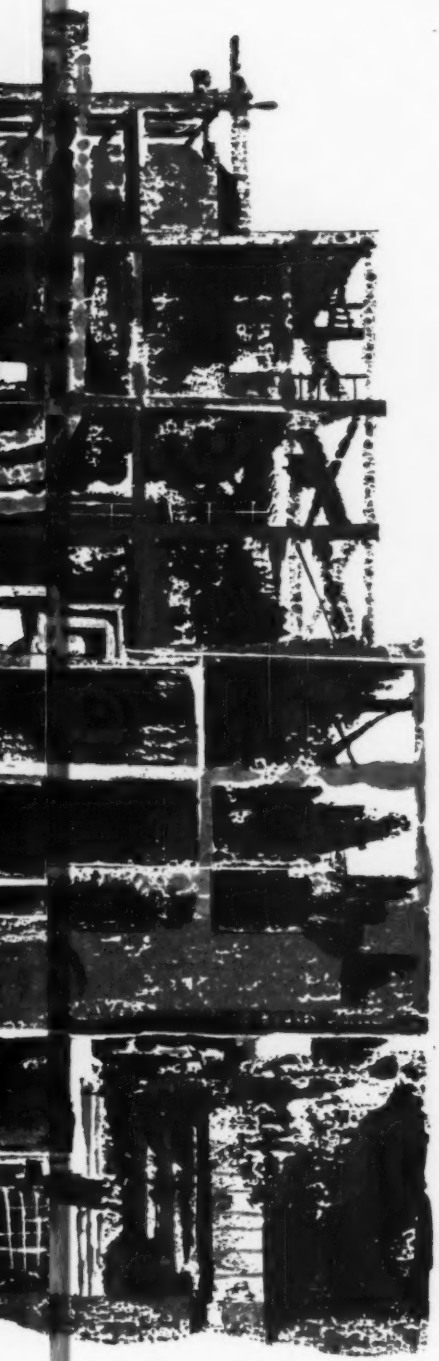
Louisville 2, Kentucky

Subsidiary of Union Bag-Camp Paper Corporation



POWER PLANT PRODUCTS HEAT ENGINEERED BY FOSTER WHEELER:

Central Station and Industrial Steam Generators • Steam Condensers and Pumps • Pulverized Fuel Systems • Feedwater Heaters • Packaged Steam Generators • Cooling Towers • Nuclear Components



The one kind of engineering every plant needs

You may use heat to produce steam, electricity, or chemical reactions—but if you use it for any industrial purpose at all, heat is probably one of your major items of operating expense. There's also a good chance that heat is costing you more than it should.

That's because every piece of equipment that uses heat—be it a steam generator, heat exchanger, or simply piping—is a potential weak spot in your budget unless it is engineered to get the *optimum* out of the heat-dollars you put into it. At Foster Wheeler, getting the *most* out of heat is expressed as *Heat Engineering.*

Heat Engineering is the reason you'll see FW-built equipment in such critical places as nuclear power stations, on the world's largest and most efficient tankers and naval ships, in giant steam-electric plants, and refineries and chemical process plants of all types and sizes.

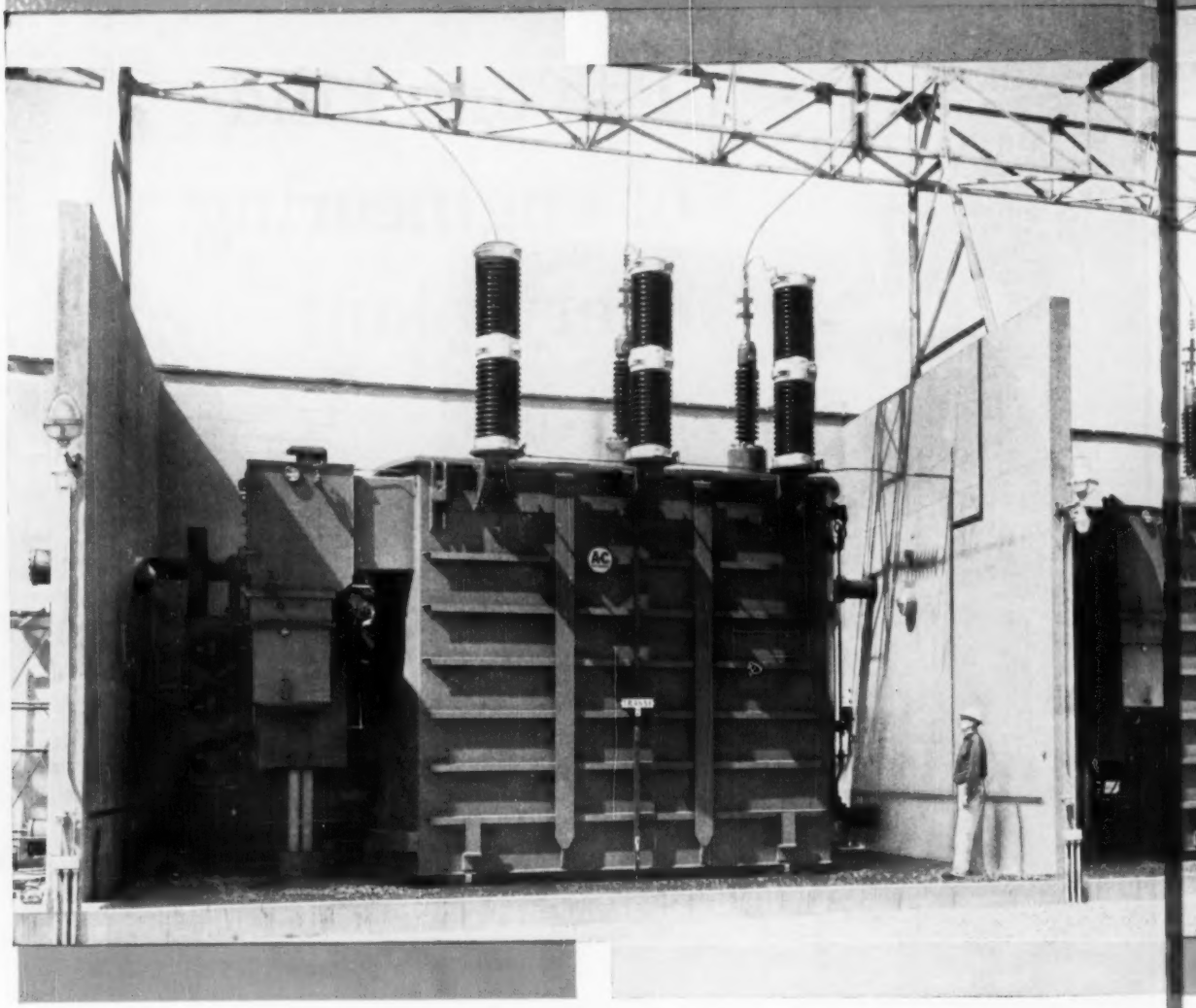
If your company is contemplating *any* modernization, expansion, or replacement where heat is concerned, why not check into the difference *Heat Engineering* can make? Contact Foster Wheeler Corporation, 666 Fifth Avenue, New York 19, N. Y.

Heat Engineered products, plants and processes . . . for the world's industrial progress.

FOSTER WHEELER

NEW YORK LONDON PARIS ST. CATHARINES, ONT.

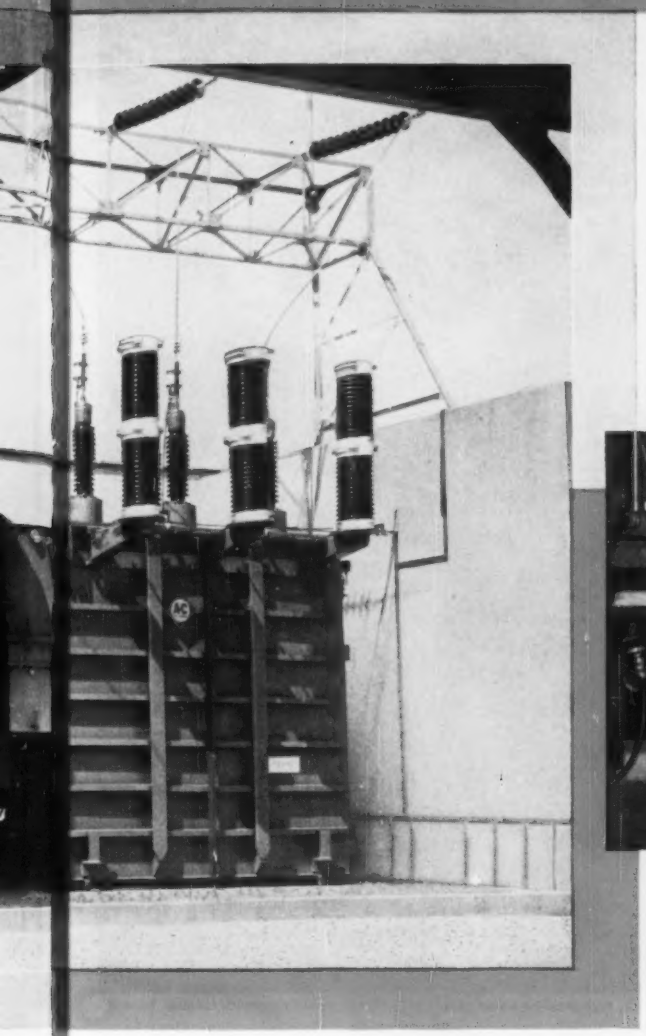
ALLIS-CHALMERS... Pacing



AT WISCONSIN ELECTRIC POWER COMPANY

Dual cooling takes the heat off emergency loads

*Patented



Manual shutoff valves serving transformer cooling equipment piping are opened when dual cooling is necessary. A transformer can be taken from service without draining the oil from the unit or its piping.

A-1155-E

Either of two 90-mva transformers is capable of carrying 2/3 of the combined capacity by using the "dual-cooled" feature

Wisconsin Electric Power Company counts on *designed-in* power transformer emergency capacity. Exclusive *dual-cooled* arrangement* uprates either one of the 90-mva transformers to 120 mva if the other is removed from the line.

The active transformer utilizes all of the other unit's oil-to-air cooling equipment to dissipate heat. In normal operation, each transformer uses its own coolers independently.

Stepping down 138,000 volts to 13,800 volts, the transformer bank employs accordion-type expansion joints between transformers. Header pipes allow for manual cutoff. The installation has been designed to permit adding a third transformer should demand require it.

Dual cooling is but one of many A-C advantages resulting from continuing transformer research. Others include corona-free design, quiet operation, reduced size and weight, high short-circuit strength. A call to your A-C man will bring further dual-cooling power transformer details.

ALLIS-CHALMERS *POWER FOR THE FUTURE*

The special gun shown here is used to weld tubes in condensers operating in high temperature, high pressure steam generating systems, minimizing contamination hazards.

CONDENSER TUBE WELDING INSTALLATIONS MINIMIZE COSTLY CONDENSATE CONTAMINATION

With today's high pressure, high temperature boilers—even more so in tomorrow's nuclear-fueled steam plants—there's no tolerating of condensate contamination through connections at the headers. So next time you re-tube or install original equipment, investigate the welding of tubes to header plates.

Already field-tested and shown to minimize contamination hazards, the welding method of tube installation is now available to you. Chase offers you assistance in making arrangements for the services of a skilled welding firm who will rent you the special welding equipment that is needed, or furnish supervision necessary for installation.

You can get full information by writing to Heat Exchanger Tube Sales, Dept. EW119, Waterbury 20, Conn., or your nearest Chase warehouse or sales office.

Chase

BRASS & COPPER CO. WATERBURY 20, CONN.

Subsidiary of ***Kennecott Copper Corporation***

THE NATION'S HEADQUARTERS FOR **ALUMINUM • BRASS • BRONZE • COPPER • STAINLESS STEEL AND FORGINGS**

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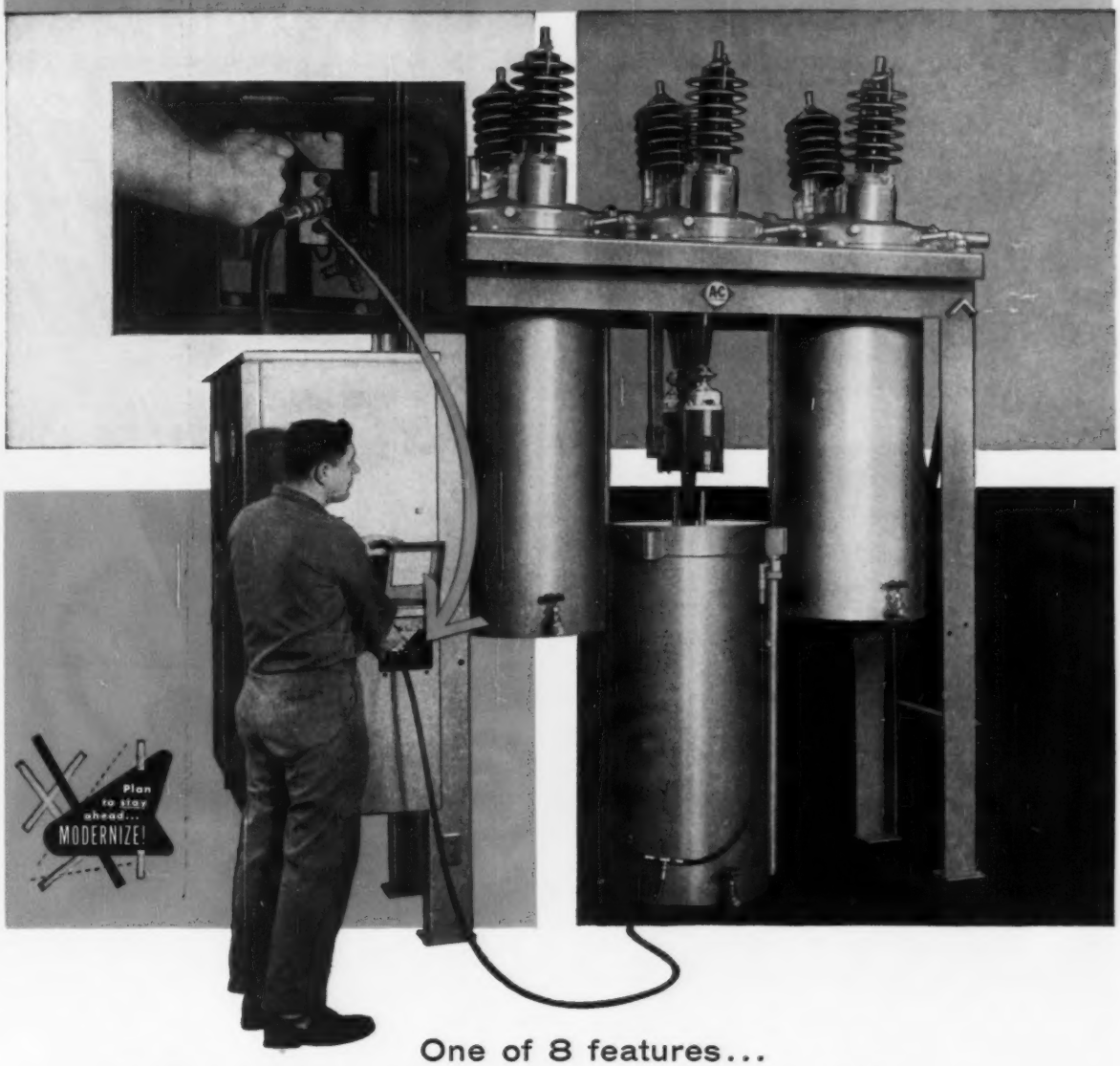
ALLIS-CHALMERS... Pacing Power Progress



One of 8 features...

light, fast-acting hydraulic tank lifter

LIFTING and lowering tanks is a one-man job with light, easy-to-handle, easy-to-operate A-C tank lifters. No cables, no pulleys . . . can even be operated manually with *Pneu-Draulic* operator hand pump if control power is not available. Compared with old methods of raising and lowering tanks — takes 80% less time.

Operating Advantages

But this is only one of many outstanding operating advantages of Allis-Chalmers large frame-mounted breakers.

Standard A-C features include:

New 5-cycle interrupting devices
Reliable, fast-acting *Pneu-Draulic* operator
Mechanically and electrically trip-free
Float-type oil gauge
Position indicator
External adjustment of overtravel stop
Single lift-rod guide for accessibility

Write for Bulletin 71B8475. Contact your nearby A-C office or Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wis.

Pneu-Draulic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-5958-E

Take Advantage of Kuhlman's

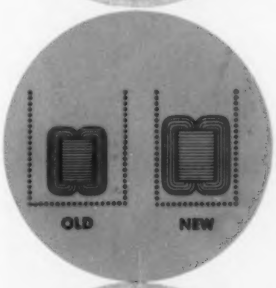
Big Bonus Year... Get More Transformer for Your Dollar—

MORE OF EVERYTHING NEW

New slim, trim look! Bigger core and coil; smaller, trimmer tank.

More copper—more steel—more economy—at no extra cost, no increase in weight.

Lower losses—more value—more bonus features. The biggest "value-packed" transformer ever offered by Kuhlman.



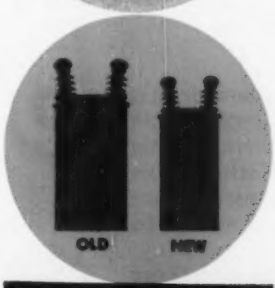
MORE PERFORMANCE

Lower exciting current—lower copper and core losses—improved impedance—better regulation—a new high in operating economy. This means less drain per transformer on your system—less revenue loss—more customer satisfaction.

NEW CONSTRUCTION

Mechanically stronger coil with greater specific dielectric strength. A newly developed thermo-setting insulation that bonds the windings into a tighter, more compact unit.

A new core and coil clamp that supports the coil independent of the core to give greater short circuit strength and less mechanical stress on the core.



SMALLER, TRIMMER TANK

A transformer bigger inside, yet smaller in all-over size. More transformer—more performance—more economy—in a smaller tank that takes up less room on the pole.

All this backed by Kuhlman's 65 years of proven reliability. All this at new, low prices.

It's Kuhlman's bonus year. You'll never get more for your transformer dollar. Ask your local Kuhlman representative for all the facts.

KUHLMAN TRANSFORMERS

KUHLMAN ELECTRIC COMPANY, Birmingham, Michigan

Manufacturers of transformers since 1894

PLANTS: Bay City, Mich.; Crystal Springs, Miss.; Salinas, Calif.

Prometheus, one of the earliest characters in classical mythology, gave the gift of fire to mortals and was punished for this infringement on the gods. He was bound to a rock to be devoured by an eagle and by the elements. But Prometheus persevered over all. His name still symbolizes enormous endurance over incredible hardship.

ENDURANCE BREEDS CONFIDENCE

Symbols that clearly show unusual endurance over the elements are uncommon. The mythological Prometheus represents strong day-after-day endurance. There's another such symbol, too . . . but not fictional. Kerite Cable, year in, year out, successfully resists the damaging effects of time and the elements. Whether exposed to the humid heat of the tropics, or the rigors of the cold damp Arctic, Kerite, wherever it is used, can be relied on for outstanding performance. That's why there is little cause for surprise when Kerite Cable laid in unusually difficult installations 40 or more years ago is found still to be in perfect operating condition today. Kerite's acceptance is greatest with those who have used it longest. Endurance, over the years, breeds confidence.

The value and service life of a product can be no greater than the integrity and craftsmanship of its maker.

KERITE CABLE

Our headquarters is at 30 Church St., New York 7.

it's the KERITE *that makes the difference*

BRANCHES IN
Ardmore, Pa., Birmingham, Boston, Cleveland, Chicago, Houston, Portland, Ore., St. Louis, San Francisco, Glendale, Cal., Seattle

Editorial Comment

NOVEMBER 16, 1959

Till the Electric Car Arrives

In the past few months, there has been much talk in the electrical industry about the rebirth of the electric car. Realizing that successful development of the electric highway vehicle could easily fill off-peak valleys and add a huge new load, utilities have encouraged the embryonic efforts of several potential manufacturers with publicity, enthusiasm, and, in many cases, firm orders.

If the electric highway vehicle is to become a reality, this support is essential. However, the fascination with this new potential obscures an existing off-peak load builder which most utilities have overlooked.

We are talking about the electric materials-handling truck. In our view, the advantages of an electric vehicle, compared to a gasoline vehicle, are more pronounced in a factory, where fire hazards are more important, costs more critical, and speed and range less significant than in highway use. Its workability has been proved. The principal ingredient needed to develop its full load potential is an aggressive utility sales effort.

The need for greater effort can be summarized thus:

Although hundreds of material-handling vehicles are purchased each year, the preponderance are gasoline powered. Each gasoline-powered vehicle represents a long-time loss of growth potential for the utility.

Thousands of industrials are still relying on manual methods of material handling when a modern electric truck could save them time, money, and labor.

Many utilities fail to set a good example in their own material-handling practice. The preponderance of gasoline lift trucks and similar vehicles in utility storerooms and maintenance shops is difficult to justify.

A hard look at their own habits and a more determined effort to get the most out of the "bird in the hand" would add a lot to off-peak loads and might help to pave the way for the electric highway vehicle.

Medallion Home Program Is In Good Hands

Full responsibility for the Medallion Home Program has been accepted by the National Electrical Manufacturers Association. We believe this is a step in the direction of continuing the efficient expansion of this vital load-building activity.

The Medallion Program was originated by General Electric as a segment of its Live Better Electrically promotion. Under GE, the effort got off to a flying start, with over 300 utilities and 6,500 home builders now actively engaged. Any utility, public or private, has had ready access to promotional materials and Medallions if they complied with the standards set. Cooperative efforts between neighboring utilities, often so necessary to take efficient advantage of overlapping media and builder areas, were set up in many localities.

Under NEMA, this fine effort can continue unabated and without impediment to continued expansion. The Association will police the standards, provide promotional material, supply Medallions, and prevent their unauthorized use. Any power supplier will be able to participate.

We know NEMA recognizes its heavy responsibility in this endeavor. We hope it will continue to get national media coverage by close cooperation with the Live Better Electrically Program, now administered so ably by the Edison Electric Institute. And we look for further gains in public acceptance of the Medallion.

A Second Coal Pipeline in Northeast Ohio?

Yes, says president of new pipeline firm, if customers, money can be lined up. Its route: East Liverpool area to Ashtabula

A second utility coal pipeline may be built in northeastern Ohio.

This one, unlike the one completed last year by Consolidation Coal Co for Cleveland Electric Illuminating Co, would be used to transport coal to dockside at Lake Erie, from which coal would then be shipped by barge to utilities and other customers in the Great Lakes area. Coal would be barged along the Ohio River to the southern terminus, pipelined in a 12- or 14-inch line to a point "near the Pinney Dock & Transport Co dock," dried, and transshipped to customers along the lakes.

The line has been proposed by the newly formed Youngstown Coal Pipelines Co. It will run from the East Liverpool area to Ashtabula, Ohio (see map below). As proposed, it will be about 90 miles long, and cost $10 to $15 million, though it could cost quite a bit less if a railroad, which is considering the plan, decides to join the project and allows the pipeline along its right of way. Estimates put the capacity of the line, if built to the 14-inch size, at approximately three million tons per year.

Customers, Money Needed

The big "ifs" in the project proposal now are customers and money. Says R. H. Henry, president of Youngstown Coal Pipeline: "We have worked out the feasibility of savings and engineering studies. We know the project is possible. We believe it can be made to save utilities quite a bit of money, based on the Illuminating Company's favorable experience. Now it is a matter of lining up customers and getting financing.

"We have already been assured of such financing, based on our engineering firm's reputation, the Eastlake (CEI) line's success, and of course, on what customers we are able to line up."

"So far as customers are concerned, YCP may be able to get more than just the utilities. Henry claims that "There has been some interest on the part of some steel mills in the Youngstown area in bringing metallurgical grade coking coal in from Ohio River barges as well. We are having discussions with at least one electric utility which is interested. If we can prove our case to that company, there are several others where the economics are very similar. We should have some definite progress to report within the next 30 to 60 days."

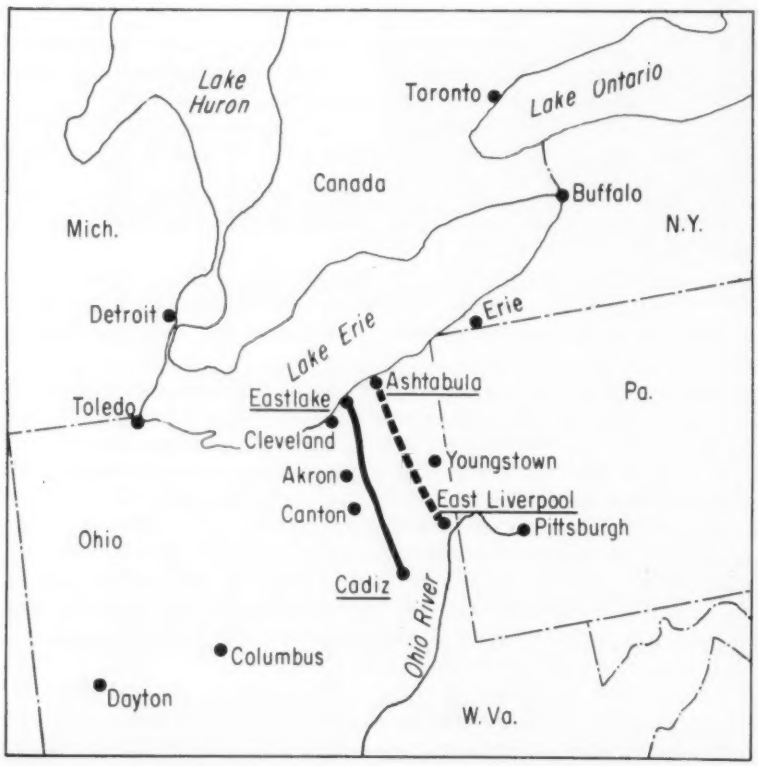
Youngstown maintains savings for utilities could be in the order of a dollar a ton. Talks have been scheduled with Toledo Edison, Detroit Edison, Consumers Power and Ontario Hydro.

While the line may very well parallel the Eastlake line, Youngstown is keeping mum on the exact route to keep real estate values along it from skyrocketing. Apparently, there's still hope the railroad will join the scheme and allow the line along its right of way.

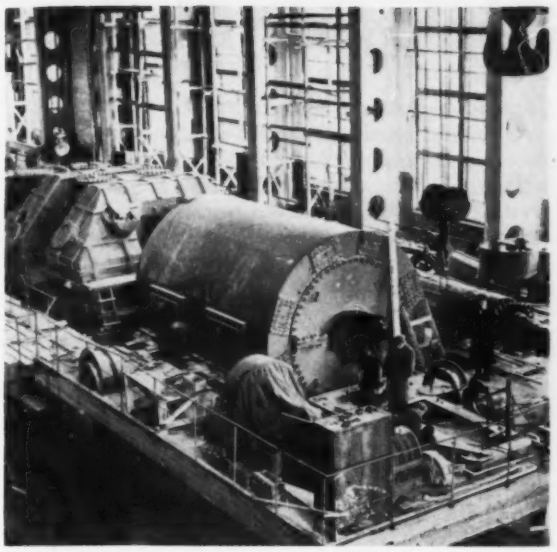
Pipeline Improvements Seen

The new pipeline, according to Henry, would take advantage of improvements in pipeline technology made since the CEI Eastlake line was built. Henry points out that the coal-drying plant used at Eastlake is now outdated by an installation in use at Johnstown, Pa., where coal is dried in connection with the mining operation. This helps cut operating costs even more than at Eastlake, Henry says.

A third coal pipeline for northeastern Ohio is also rumored. It is not yet known who would build and operate the line.



SECOND COAL PIPELINE in northeastern Ohio is proposed between East Liverpool area and Ashtabula. Dotted line does not mark exact route, not yet revealed



U.S.S.R. SETS, like this one, may not match U. S. units in all respects, but they go in service faster, Russians say

STEAM STATION in Estonia has some prefabricated concrete, a technique that has impressed visitors to U.S.S.R.

Split Widens on Soviet's Progress

The cleavage of opinion on the Soviet's future power progress has widened a bit in recent weeks following visits both to and from the U.S.S.R.

The Edison Electric Institute, on one hand, has reiterated its view that the U. S. will maintain its electrical power lead for at least the foreseeable future, and has implied there is no necessity for a crash program of American water resource development.

Recently returned visitors from the U.S.S.R., on the other hand, maintain that the U. S. is lagging in some aspects, most noticeably in the development of hydro resources. Another visitor who toured the country in 1930, foresees a distinct possibility of the U. S. being surpassed in power output by 1980.

EEI presented its case before a subcommittee on economic statistics of the Joint Senate-House Economic Committee and based its testimony on trips made to the Soviet Union. Edwin Vennard, vice president and general manager of EEI, pointed out that the Russian's goal for generating capacity in 1965 was 108-million kw compared with U. S. expectations for 245-million kw that year. At the end of 1958, the Russian capacity was 53.1-million kw vs 160.2-million kw in the U. S.

Vennard also cited a widening gap—in the U. S. favor—between the two countries' per capita use of electricity, and noted that U. S. power companies presently are developing and constructing 16 atomic power plants with combined capacity of 1.4-million kw while the U.S.S.R. has announced that five plants are completed, planned or under construction with a total capacity of 465,000 kw.

Claim Russian Gains in Hydro

Shortly before Vennard's testimony, another group of U. S. visitors finished a power plant appraisal there. Headed by Sen Frank E. Moss (D-Utah), the group agreed that Russia is pushing ahead of the U. S. in hydro development.

Moss, who is chairman of an Interior Dept subcommittee on energy resources, was accompanied by Sen Ernest Gruening (D-Alaska); Michael W. Straus, former U. S. Bureau of Reclamation commissioner and now a government consultant on power matters; Clyde Ellis, general manager, National Rural Electric Cooperative Assn; and Alex Radin, general manager, American Public Power Association.

In press reports of their comments, the visitors eventually alluded to the lead now held by the U. S. Straus, for one, put this interpretation on it: The Soviets could top the U. S. in industrial output with less power capacity because they allot 79.3% of their total capacity for industrial production compared with the 35% that goes for industry here.

Roy F. Bessey, a Portland, Ore., engineering consultant and former advisor to the Bonneville Power Adminstration administrator, expressed a warning note in last month's issue of *Public Power*, published by APPA. In comparisons of U. S. and Russian power prospects, he recommends that we not be lulled by the present U. S. lead because "we may be losing in the long-term trend if Russian capability is compounding at a higher rate."

Bessey's article plotted Russian output doubling every six years, which "is apparently nearer to actual Soviet aims," and the U. S. doubling every ten years. This chart—"not presented as a prediction, but to show what can happen" —shows the U. S. being surpassed by the U.S.S.R. in electric power output in 1980.

Utilities Learn Employing Disabled

Through programs for their employees who are injured on the job, companies are finding it worthwhile to employ handicapped workers

Utilities and municipal systems providing work for their employees who are injured on the job are learning that employing handicapped workers, besides having its humanitarian aspect, can be profitable.

Virtually all utilities and municipal systems care for their own employees who are injured while working. Jobs are found within the company to suit the limited capabilities of the handicapped worker. These programs have shown that the disabled perform their tasks as economically, skillfully, and conscientiously as able-bodied workers.

Few companies, however, actively solicit the employment of handicapped workers. Most hire on the basis of individual merit.

Of the few utilities providing work for the disabled, Detroit Edison Co has established one of the largest programs in its "sheltered workshop" which offers jobs and vocational training for the handicapped. The workshop handles much of the company's small appliance repair business.

Detroit Ed contracts for workers' services with Goodwill Industries. During the past ten years the total volume of the contract jobs has reached $750,000 spread over a hundred different types of operations.

Vice President Chester F. Ogden said Detroit Ed profits two ways from the setup:

". . . First because Goodwill employees are able to perform these tasks as economically as we can do them ourselves, and secondly, the value of the salvage material reclaimed in some of the operations nearly equals the cost to us of the contracts."

Economies achieved through salvage work done by the handicapped were also cited by the Indianapolis Power & Light Co. For the past 15 years IPLCO has been providing work for the Indianapolis shop of the Indiana Board of Industrial Aid & Vocational Rehabilitation for the Blind. It sends the shop salvaged small fittings and parts, mostly line hardware, to be sorted, tested, cleaned, and refinished.

Save on Salvage Material

IPLCO's salvage chief estimates the material salvaged through the work of the blind in the last five years would cost about $30,000 if bought new.

In San Antonio, Tex., the City Public Service Board has had a limited program for the past four years for hiring handicapped workers. There have never been more than eight handicapped workers on special jobs at one time. At present there are four.

The disabled workers are hired as time and materiel clerks in the materiel department of the electrical operations division. They keep track of materiel and supplies used on the jobs, handle work orders, and prepare cost and time sheets.

This job used to be assigned as an extra clerical chore to the senior helper on a line truck. The Board decided

HANDICAPPED WORKERS repair distribution transformers in Detroit Ed's "sheltered workshop"

Detroit Ed's 'Disabled Program'

Detroit Ed provides finance and parts, Goodwill the labor, in this 11-year-old program. Contracts totalled $750,000 in first 10 years.

Program began as a "work tolerance" plan for arrested TB cases. Most in workshop now are arrested TB cases. Others have: orthopedic difficulties; cardiac conditions; impaired sight; impaired hearing.

Handicapped workers receive $1 to $1.75 per hour.

Disabled handle almost 100 different jobs: process all DE's scrap salvage work; perform tool repair and alter purchased equipment to meet DE standards; handle packaging jobs, building special crates for transport of disconnects and transformers; perform appliance repair.

Time studies show:

- 28 repairmen produce an average of 6,000 repaired irons a month.
- 10-man transformer crew repairs 40 to 50 transformers a day.

Workers Pays Off

to hire handicapped workers for the job because it felt they would be more dependable, more interested in the job, more likely to keep an accurate record, and less likely to have a high turnover rate.

Many utilities and municipal systems are hesitant about hiring disabled workers for one or more of the following reasons:

- Some feel their operation is too small to warrant seeking out handicapped workers.
- Civil service procedures of trying to get the best person available for each job inhibit some federal or municipal systems which seek to hire the disabled.
- Companies feel disabled workers are limited to office or appliance work. They cannot be given jobs considered hazardous, such as construction work.
- Well-intentioned laws may work against handicapped job-seekers.

In particular, the Georgia Workmen's Compensation Law stipulates that any company hiring handicapped people is responsible in full for any pre-existing physical disability that is aggravated by the worker's performance on the job.

Feeling that this is a big risk for an employer to take, Georgia Power Co officials have on many occasions discussed this problem with the State Compensation Board. The Board is not willing to waive that responsibility, however.

Meanwhile, utility programs to combat disabling diseases such as mental illness and alcoholism are slowly gaining.

A life insurance company executive recently asserted that mental disturbance costs business and industry billions of dollars each year. "It is clear," he said, "that the ultimate cost of neglecting the problem of mental illness will be far greater than the cost of solving it."

Mental Health Centers Suggested

He suggested that companies establish mental health centers for employees or perhaps hire fulltime company psychiatrists.

Few utilities appear to have advanced beyond the stage of providing closer personnel relations and having company medical-surgical-hospital insurance plans provide for hospital care of mentally ill employees. Pacific Power & Light Co's plan includes reimbursement also for shock therapy.

Southern California Edison Co has introduced a program of personnel relations conferences between a psychologist and supervisors. They discuss problems in personnel communication, worker fatigue and related matters.

At these conferences, conducted by a psychology professor of Occidental College, Los Angeles, Calif., problems under discussion are worked on from a psychological approach. Situations are often re-enacted with scripts. The conferences take place at SoCalEd's General Office. The 15 to 20 participating supervisors then move out to the 29 district offices, completing the circuit in about six months.

Regarding alcoholism, there is a growing realization of the part an employer can play in the curing of alcoholic employees. It was recently estimated there were at least two million alcoholics in industry. Their accident rate was high, they had absentee rates about four times that of the average worker, and they were frequently irritable with co-workers.

BRAZING WORK, requiring skill and coordination, is performed by disabled Goodwill Industries worker

The old method of firing an alcoholic when his disease interfered with his work has given way to an enlightened approach to the problem. Industries have undertaken programs to find and help hidden alcoholics.

Recently Dr Daniel J. Feldman, of the New York University-Bellevue Medical Center Industrial Alcoholism Clinic, asserted that the "or-else" technique had proved effective in curing alcoholics. This method entails threatening an employed alcoholic with loss of his job unless he begins treatment.

A West Coast utility found that this method worked well. Persons who developed a drinking problem were warned they were endangering their careers with the company.

Alcoholics with good work records of 10 to 15 years with their companies have a strong motivation for keeping their jobs. When placed on probation by companies who participate in the "or-else" program, these alcoholics have responded well, showing an 82% arrest of alcoholism, and rehabilitation. Special stress is laid on early detection and treatment.

Many companies, like Commonwealth Edison Co, pay alcoholic employees company insurance, health benefits, and wages while they are taking the cure.

NEMA Streamlines Organization f

Plans broad decentralized structure of eight divisions; Also assumes responsibility for Medallion Home program

In the most important and most action-packed convention of its 33 years of existence, the National Electrical Manufacturers Association meeting in Atlantic City last week decided to:

- Approve a sweeping reorganization of its internal structure, decentralizing authority and activities under eight major divisions (see charts at right).
- Assume administrative responsibility for the highly successful, industry-wide Medallion Home promotion program, which has previously been administered by the General Electric Co.

The NEMA membership elected N. J. MacDonald, president of the Thomas & Betts Co and chairman of National Electrical Week, to be the president of the reorganized association. W. C. Wichman, vice president, General Electric Co, and general manager of the Hotpoint Div., was elected vice president of NEMA.

Plan for Faster Action

The historic convention also served as a backdrop for a number of other industry announcements and pronouncements. Retiring NEMA President Joseph L. Singleton, senior vice president, Allis-Chalmers Mfg. Co, pointed up some of the highlights among NEMA's 1959 activities in the first illustrated annual report made at the Association's convention. An analysis of the latest edition of the National Electrical Code was released at the convention. The analysis noted that the code is in step with the industry's campaigns for full "Housepower." A preliminary report on a study of radiation effects on wire insulation was presented by a staff member of the Naval Research Laboratory. Revised standards for electric power connectors were announced. And plans for a number of new promotional activities were disclosed.

Among other things, the drastic reorganization plan voted by NEMA probably means there will never again be another of the sprawling NEMA conventions such as that held last week. More likely the NEMA convention of the future, said the planning board which drew up the reorganization chart, will be a one or two-day general meeting of leading figures of the electrical manufacturing industry, and with few, if any, Section meetings taking place at the same time.

Main goal of the reorganization plan is to give NEMA members faster and more direct action through the particular Sections encompassing the product scope of the member. Under the previous structure, NEMA had 95 subdivisions which included 65 product sections.

Under the new plan, the Sections will be grouped under eight major Divisions (see chart at right). The plan offers a link between Sections and the Board and the Officers Committee. It gives Sections a direct voice in NEMA affairs—in finances, budgets, programs, and objectives.

In offering the reorganization proposal, the planning committee set forth this description:

"Each Division will, in effect, operate as a semi-autonomous trade association under the NEMA banner, participating in many of the same overall programs. It will name its own Board of Directors (composed of representatives from each of its Sections) and such officers as the Directors may elect.

"Each division will have its own scope, which may be considerably broader than the sum of the product scopes of its member Sections. It will authorize the formation of new Sections as necessary—or discontinue existing ones. It will have the type of setup necessary for member companies to get things done—fast and on a Divisional basis."

W. C. Wichman, who headed the committee which drafted the reorganization plan, said the proposal would "introduce the life-giving principle of decentralization . . . and allow the product Sections, the building blocks of NEMA, to control their own destinies, to the end that NEMA can successfully adapt itself to the changes of the past and the challenges of the future."

One of the significant steps planned under the reorganization is increased emphasis on more effective NEMA business development programs to supplement presently solid standardization and statistical activities. In advocating this approach, Wichman said, "If our industry is to continue to grow and prosper, all of the product businesses we represent must give better value to their customers, and be sure that the customers recognize

NEW PRESIDENT N. J. MacDonald also heads the Thomas & Betts Co

NEW NEMA VP W. C. Wichman is also general manager of Hotpoint

for Future

the significance of this contribution. This calls for soundly based, customer oriented, imaginative programs directed toward development and growth of the individual product lines of our member companies."

In his presentation, Wichman also said that NEMA's activities "are profoundly affected by the increasing competition of other industries," and that NEMA must work closely with its electrical trade allies to "meet the challenge of gas."

Wichman further noted that "NEMA must find a way to compete against imports, but at the same time cooperate in world-wide standardization" . . . and "recognize and successfully deal with increasingly powerful government at all levels."

1959 Actions Highlighted

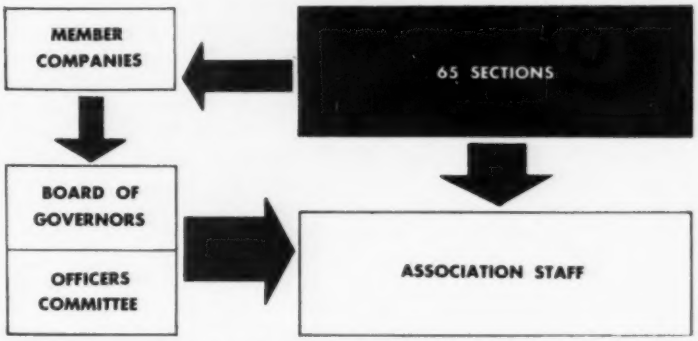
In his illustrated annual report, NEMA President Joseph L. Singleton highlighted these 1959 actions:

• The NEMA Excise Tax Committee started a concerted drive on the entire question of discriminatory aspects of the federal excise tax structure and made plans to appear later this year before a Congressional Committee on the excise tax problem as it relates to electrical products.

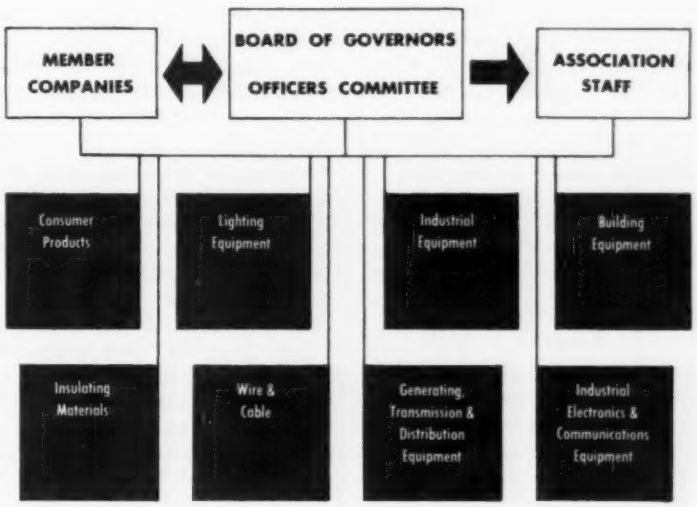
• The Codes and Standards Committee launched surveys among manufacturer and worked with power suppliers to determine industry attitudes on the possible application of higher utilization voltages for homes.

• The Association's National Security Committee took on the assignment of foreign import problems and tried through every available channel to convince the government that the importation of heavy power-producing equipment should be limited because of its essentiality to the security of the nation. In this endeavor, there were both plus and minus results. There was some strengthening of a provision of the trade agreements act to pin point the dependence of national security on the availability of adequate power. The public was alerted to the inroads being made in the country's security and economic welfare

(*Continued on page* 70)



BEFORE reorganization, the NEMA structure looked something like chart above with the individual sections having little direct authority



AFTER reorganization, the separate sections have direct representation in each division, and through the divisions to the Board of Directors

Sections to Have Bigger Say in NEMA

The charts above indicate in a general way the streamlining and decentralization features of the new NEMA organization. Top management will remain vested in the NEMA Board of Governors. Under the new plan, however, the Board will be smaller. It will include 24 members to be nominated and elected by the membership, as previously: the chairmen of the divisions; and two others who may be appointed by the Board, itself. Thus the Board will have a maximum of 34 members, compared with 44 previously.

Formation of Divisions will be a matter to be decided by the Board of Governors. The Board will approve the product scope of each Division and assign to Divisions those Sections of the existing organization which are compatible in products, markets, and problems.

Each Division will be served by a staff secretary and as many section secretaries and specialists as may be needed.

Member companies will automatically become affiliated with those Divisions which include the section or sections to which they belong. Divisional representation on the NEMA board is designed to assure the sympathetic presentation of problems from the various sections.

NEMA Streamlines Organization (*Continued from page 69*)

through the continued importation of foreign-built heavy electric power-producing equipment. But a government agency found that imports of heavy electric equipment were not a threat to impair the national security.

• The National Wiring Bureau, NEMA's largest industry-wide program to further the adequate wiring and wiring modernization in homes and commercial structures, continued to operate as an "inter-industry" team in the wiring field with power suppliers, electrical contractors, distributors, and electrical leagues all sharing the planning and work load.

Singleton also noted that the Switchgear Section had launched an engineering project through its power circuit breaker group to determine future plans and requirements of the nation's power suppliers, and to discover, specifically, what circuit breaker ratings the industry expects to purchase during the next five years.

Medallion Program to NEMA

NEMA's move to accept responsibility for administering the Medallion Home program answers a question that has been widely pondered in the industry. Edison Electric Institute's newly named Live Better Electrically program will continue to promote the Medallion Homes in national advertising.

NEMA will provide headquarters staff to make sure that standards set or revised by local utilities meet established minimums. This staff will also provide promotional material for industry use, and make available to participating utilities a continuing supply of gold and bronze medallions. The staff will also have the responsibility for preventing the unauthorized use of the medallions.

The Medallion Home program is currently spearheaded at the local level by more than 300 utilities, who are exclusively empowered to award medallions to qualifying homes in their service areas. Industry surveys indicate that over 170,000 new homes have been certified for either bronze or gold medallions during 1958 and 1959.

In the analysis of the recent additions to the National Electrical Code, it was noted that one major revision requires that several home appliances and hand-held tools be grounded. Among these are clothes washers, dishwashers, automatic drills with a chuck capacity over ⅛ in., hedge clippers, lawn mowers, sanders, and saws.

Also, the new code requires, rather than just recommends, that "single family residences, with an electrical load of 10 kw or more, have a minimum service of 3-wire, 100-amp capacity." The code refers for the first time to something comparatively new on the home appliance scene—wall ovens and countertop cooking units. Both are treated as being "fixed" appliances, and each must be served by its own individual 20-amp branch circuit.

From the U. S. Naval Research Laboratory, Dr. John W. Kallander brought news of a study being made of the effects of nuclear radiation on electrical insulation. The Laboratory investigation will also include evaluating the effects of radiation on representative types of insulation.

This information, said Kallander, will be given the Navy and various technical societies so that they can write specifications and make necessary decisions with respect to present and future insulation materials. Results of Navy research also will provide a basis for rating magnet wire insulations in general use today according to their radiation characteristics.

NEMA's Wiring Bureau announced during the convention week a broad new campaign to promote and sell commercial wiring and rewiring. Under the slogan, "Keep Pace Electrically," the Bureau, with a big assist from the National Electrical Contractors Association, will run full-page ads in Business Week and Fortune, and year-long schedules of smaller ads in numerous retail and trade magazines. The campaign will stress the profits to be made from improved lighting in commercial establishments.

MEDALLION HOME program will be administered by NEMA after Jan. 1

Other promotional and publicity activities were announced by NEMA sections. These will cover electric ranges, water heaters, dishwashers, refrigerator-freezers, room air conditioners, and housewares.

The minimum design standards for both aluminum and copper connectors, which were announced as standards SG1-1958, also include recommended tightening torques for aluminum and bronze bolts. The standards were drawn up by the electric power connector group of the Switchgear Section.

Capacities Are Up

Speaking before the Wire and Cable Section, C. W. Higbee, assistant general manager of the Electrical Conductor Division of the Kaiser Aluminum and Chemical Co, said progress has been made in raising the ratings of residential service entrances. He cited the results of a recent survey of sales by manufacturers which, he said, showed that American homes enjoy much greater power capacities today, for their electrical utilization, than before the large-scale concentrated national promotion of home wiring.

A NEMA 50-year award was presented to Clarence T. Evans, consulting electrical engineer for Cutler-Hammer, Inc. In the course of his career, Evans was awarded 50 patents in the motor control field. He served as NEMA's principal representative on the National Fire Protection Association's code-making panel dealing with motors and generators.

The new NEMA president, N. J. MacDonald, formerly served as chairman of the executive committee of the National Wiring Bureau. He has been active for several years in a number of NEMA activities. He became president of The Thomas & Betts Co after serving as general vice president and vice president of sales.

ELECTRIC COMFORT HEATING and HEAT PUMPS

1959 ELECTRIC HEATING SURVEY

FOURTH ELECTRICAL WORLD CONFERENCE

A PROGRESS REPORT

Electric heating and the heat pump, the Cadillacs of the electric industry, will sell but need aggressive promotion, Conference reveals.

Electric heating is to the electric industry what Cadillac is to the automobile industry, and it has to be sold in much the same way. It may cost more, but it's also the best and people are going to want it.

Electric heating isn't going to be sold "supermarket style"; utilities are going to have to develop aggressive, hard-hitting sales programs if they want to get their rightful share of the heating market.

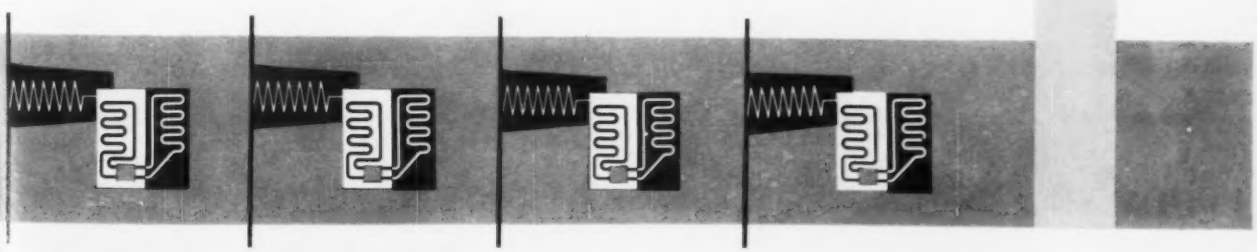
Electric heating and heat pump manufacturers will have to pay close attention to the quality of their product if they expect it to gain wide acceptance with the American consumer.

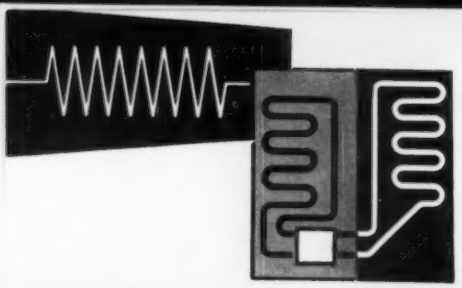
Speaker after speaker at Electrical World's Fourth Electric Comfort Heating and Heat Pump Conference held Oct. 21 and 22 in St. Louis emphasized these points. (The Conference was co-sponsored by NEMA's Electric House Heating Equipment Section and selected heat pump manufacturers.)

For reactions to these and other points about the fabulous future of electric heating, turn the page.

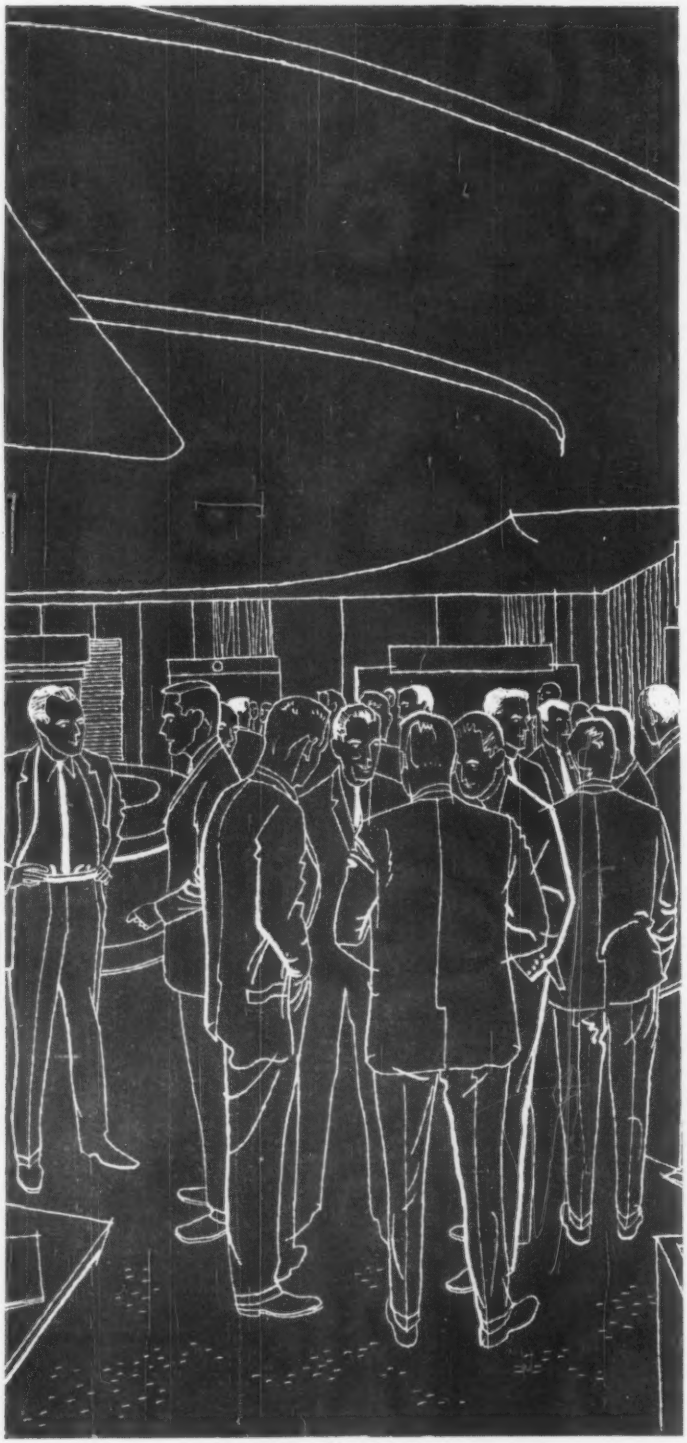
T. R. JORDAN
Asst Managing News Editor

JOHN D. DAMON
Commercial Editor





Sell Electric Heating



"This electric home heating is the Cadillac of heating and I think if we take that view of it and adapt the heating to the home, we're in a much better position. People don't go necessarily for the cheap. And if you can find what their desires are and their wishes, you can sell them even at a higher price."—Allen King, EEI president, and president, Northern States Power Co.

"Electric heating still has a . . . way to go to be equal in cost (to gas). (It) cannot be sold on price alone. Selling the benefits such as comfort, control, cleanliness and safety will help convince the customer to buy. All the advertising money and manpower cannot sell electric heating unless this type satisfies the customer and fills the customer's need. Installation must be good, insulation must be adequate, and equipment must function properly."—Malcolm R. Rodger, vice president of Middle West Service Corp.

Or Assistant to the President of Edwin L. Wiegand Co, Pressly H. McCance: "What's needed now is a look at the direction and calibre of electric heating's promotion. It has, in certain areas, been undirected or poorly promoted, with the result that in too many areas electric heating has now become associated with cheapness. We must continue to sell up, not down."

Gas Competition Still Strong

On the gas competition problem, speakers had this to say:

"Electric heating and heat pumps have presented electric companies with the greatest opportunity for load building they've yet had. But the industry is being 'clobbered' by the gas industry. Most players on the electric team are waiting for the other guy to carry the ball, and as a result not much is getting done."—R. G. Werden, president, Valley Engineering Co.

"Much of the revenue growth in the gas industry has come from gas heating sales where the electric side was not providing sufficient competition. Recognize the gas industry as a strong and dynamic competitor."—Rodger.

"Don't expect any quarter from the gas industry. Their last cherished market is now being threatened."—McCance.

Right down the line, from Wednesday's first speaker to the wrap-up on Thursday afternoon, speakers drove home these thoughts, and ones with similar overtones.

In welcoming the delegates to the conference, C. F. "Chuck" Hochgesang, Electrical World's editor detailed the purposes of the fourth conference. They were, he said, to examine electric heating from the utility, manufacturer, installer and customer view-

Benefits, Not Price, Attendees Hear

point, furthermore, and to examine it "in depth."

Hochgesang noted that the present meeting showed that previous skepticism about electric heating had "flown the coop."

EW's editor also traced the growth of electric heat from the middle fifties when utilities found their traditional winter peaks upstaged by growing summer demands from air conditioning, to 1956 when 270,000 homes and buildings had resistance heat and 13,000 had heat pumps, to 1958 when the traditional "doubling in ten" was in danger unless "some new, vibrant, important load . . . to pick up where air conditioning and its predecessors left off" was found.

J. W. McAfee, Union Electric Co's president followed and welcomed the delegates to St. Louis.

Harold Turner, American Electric Power's executice vice president kicked off for the regular speakers and reviewed electric heat as his company sees it.

AEP has made some projections of expected growth in heating load for the System, Turner revealed. Saturation figures will reach 10% in 1968 and 25% in '78. AEP will have 2.2 million customers by 1978, and 18,000 kwhr use annual for heating and cooling, and a home heating load of 9 billion kwhr.

Westinghouse, he pointed out, says the utility industry could add 355 billion kwhr by 1978, based on 80 million customers and 25% saturation.

Even if the assumed saturation turns out to be lower, the potential for growth in load and revenue, is "scarcely less than fantastic," Turner said.

Another AEP forecast showed what the projected growth in heating loads could mean in terms of utility plant investment. With current dollars of gross plant invested per million kwhr of sales, $615 million would be required in new plant. Assuming that by 1978 the investment per million kwhr of sales may reach $75,000, the added plant investment for the AEP system would be $675 million.

In the same way the electric home heating market load for the whole utility industry can require a total added investment in electric utility plant on the order of $35 billion, Turner revealed.

T. R. Jordan, Assistant Managing News Editor, presented the results of Electrical World's Electric Comfort Heating and Heat Pump Survey (see p 77).

Middle West's Mal Rodger, expanding on his remarks about the next decade, quoted earlier, noted that the use of electricity is expected to exceed any other fuel by 1975. But don't sit back and wait for it, he warned.

Much of the revenue growth in the gas industry has come from gas heating sales where the electric side was not providing sufficient competition, however, he said. Gas heating sales are expected to reach 38 million units in the sixties.

"Sales will greatly exceed the unit sales and dollar volume of electric heating, but if we aggressively push, effectively organize our sales programs, our manpower, and approach electric heating as a team, we will make inroads into the market," he said.

Here Are Ways to Help

He listed these which will help sell electric heating:

1. Companies with summer peaks will recognize the need for electric heating to fill the valleys

2. Money is being provided for sales promotion

3. More companies are adopting heating rates and budget or uniform billing

4. Consumer prices of electricity and gas are becoming more competitive every day.

Though electric heating will have increased com-

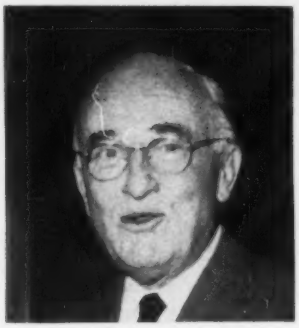
HOCHGESANG

McAFEE

JORDAN

KING

TURNER



McCANCE

petition for the purchasing dollar, there should be at least 4.5 million electrically heated homes by the end of the sixties, Rodger said.

Wednesday luncheon speaker Allen King has found that the utility industry is being compelled by its own history to consider electric heating as the future load.

King said, "We should be getting into this business of climate control and winter heating in advance of the day when we feel *compelled* to and have to put on a crash program to accomplish our results."

Electric heating is here today and people are going to demand it, he said. The industry should, therefore, actively promote it, pioneer and develop the facts necessary to assist customers to use it best.

"Let us, in this new field, be leaders not followers," King said.

Can Utilities and Manufacturers Agree?

Will utilities and manufacturers ever be able to get together? Valley Engineering's Werden asked the group. What are some of the problems blocking this teaming?

Impatience is one. Electric utilities are impatient with manufacturers' product development; manufacturers are impatient with utilities' lack of promotion and attractive rates.

Another is electric companies who haven't made up their minds about the market. "Don't wait until the whole electric industry endorses it," he said.

Manufacturers are spending large sums to promote summer cooling, Werden pointed out. He suggested instead they consider the heat pump. "Then no dollars have to be spent to create a heating market, and the differential in price to the consumer to get summer cooling will not begin to take the promotional budgets now required," he said.

All is far from lost, however, Werden commented. The electric heating industry has a fabulous potential. All it needs is: Attractive rates in keeping with the benefits derived; improved product performance as to COP; product durability; and first class service.

There are other things too, according to Pressly McCance. "What's Needed Now?" he asked.

Continuing growth first of all, he said. "To counteract the inflationary rise in the cost of labor and materials, continuing growth offers the opportunity for balancing economies with a view toward the lowest possible cost per kwhr," he said. And electric heating appears to be the "veritable backbone" of continuing growth.

Better information is needed on the characteristics of the heating load, he said. "The fear that electric heating is too expensive to serve is today inhibiting the growth in too many areas."

What's needed now is a look at the direction and calibre of electric home heating promotion so that it won't become associated with cheapness; an upgrading of the sales approach by manufacturers, utility salesmen and others, so that in days ahead "a corrective type of program will not be needed" as was for adequate wiring, he said.

Any evaluation of electric space heating load must be considered by the effect it will have on percent return. Utilities can improve this return by adjusting rate levels so that each kwhr brings in more revenue. Another way is to improve the system load factor.

A 10% increase in load factor can increase percent return by one percentage point—at present levels this is equal to an increase of about 16% in net income for return.

This, Robert Morse Wood, Ebasco Services' marketing consultant, told the group.

Most companies with summer peaks have recognized the value of the electric heating load and taken steps to promote it because it fills the winter valleys, Wood said. But many companies with winter peaks have been reluctant to move into high gear for fear the load will only compound their troubles.

Two factors make it probable that the trend toward summer peaks will continue. First, design criteria for air conditioning installations do not vary much, and secondly commerical and industrial lighting levels are rising, requiring more air conditioning.

"Perhaps the time has come for winter peak companies to consider the air cooling and heating loads as one load, not two, divide the cost-to-serve, . . . and price the two together to reach the widest markets," Wood suggested.

Electric heating is a big load, Wood pointed out. It will multiply average use per residential customer by as much as eight times.

Just what effect will a load of this size have on the balance sheet income statement and percent return of a winter peaking company?

According to Wood, incremental costs per kwhr should decrease as long as the value of the dollar remains constant. Generation expenses should decline.

The potential of the electric space heating load is equal to about 20 years' growth of the electric industry at present rates, he said. It can justify investment in the largest, most efficient generating stations. This alone will help cut down generating expenses and sweeten the balance sheet, he said.

Basic Obstacles Overcome

Thursday's luncheon speaker, W. R. "Buck" Persons, president of Emerson Manufacturing Co, a recent entrant into the electric heat sweepstakes, said that EW's heating meeting last year convinced him that the basic obstacles had been overcome and that electric heat was going to become a reality.

Some mistakes are still being made in the eagerness to get the electric heating story across, Persons said. There are some badly designed products being marketed, many poor service installations, and poor applications not giving good service. All this is creating "serious apprehensions" about electric heating in the customer's mind.

"But electric heat is bound to go," he commented.

Some of the things which will make it go, he said, are, the tremendous acceleration in research and development, and a revolution in sales.

Dedicate to getting the distributor, dealer, salesman and all others convinced that electric heat can't fail, Persons told the group.

Arkansas Power & Light's William M. Shepherd brought the conferees up-to-date on two important reports having a bearing on the role utilities play in selling electric heating and heat pumps to the multiple housing market.

Both—the Gilbert Report and Capehart Housing Report—were designed to present "objective analyses to persons concerned with the design and building of these projects."

The Gilbert Report, with an initial printing of 1,000, was distributed to 780 people in utilities, 116 in government, and 110 miscellaneously. Since then, 4,700 have been distributed to utilities, 116 to government personnel, and 450 miscellaneous purchases were made.

The Capehart breakdown was this: Of the 1,800 copies printed, 100 went to government officials, and the balance to utilities for distribution.

Shepherd concluded with a performance and service data report on the now famous heat pump installation at the Little Rock, Ark., Air Force Base.

In 12 months, there have been 2,219 service calls, or 1.44 per year per system. More than 500 never had to be looked at, he said.

C. W. Cheatham, Alabama Power Co's supervisor of heating and air conditioning, summed up his feelings on the chances of the heat pump being accepted by the consumer as *the* way to heat.

Manufacturers should:

- Provide a well-engineered, efficient unit, operating dependably on an essentially automatic basis
- Build distributor and dealer organizations so that in time the dealer will become self-sufficient
- Establish realistic ratings in heating and cooling capacities and their electric load
- Hold the line or reduce installation cost through quantity production.

Utilities, on the other hand, must:

- Maintain aggressive heat pump programs
- Provide capable representatives to work with distributors and dealers
- Provide rates that will keep heat pump operation cost on a competitive basis.

Electric heat is the latest tenant in apartments and churches, and very welcome. This was the opinion of three speakers, Marcus S. Gilbert, special representative, Commercial and Industrial Sales, Indianapolis Power & Light Co; Richard Van der Ford, heating and air conditioning engineer, Indiana & Michigan Electric Co; and Rev. Dean Burton, minister of the New Brunswick Church of Christ in Lebanon, Ind.

PERSONS

SHEPHERD

RODGER

WOOD

KREISER

WERDEN

Electric utilities should welcome electrically heated apartments, Gilbert said, because when electric heat is installed all of the appliances are usually electric.

Van der Ford is enthusiastic about the electric heating load from churches. Demand is always in the valleys of system load curves; space heating has a perfect power factor; and there is a large available market.

The inside view was given by Rev. Burton, who said he likes electric heat because it eliminates the need for a furnace room or flue; eases custodial duties; the economy of operation is even better than estimated; and cleanliness and freedom from smoke and soot are a blessing.

C. F. Kreiser, chairman of the electric house heating equipment section at NEMA and general sales manager of the Edwin L. Wiegand Co, presented the new "NEMA Standards For Electric Household Heating Equipment." (See box below for highlights.)

He noted, however, that the standards will provide utilities, builders, architects, and others with an important yardstick against which to measure performance, quality, etc. "For utilities it is a means of safeguarding the future of the greatest load builder that has ever come their way," he said.

Highlights of NEMA's New Equipment Standards

Baseboard Heaters

Sheet metal enclosure — 194 deg maximum temperature

Outlet air temperature — 200 deg maximum

Wattage ratings progress in logical steps. Avoid ratings like 666 w, 1,134 w

Voltage ratings — 120, 208, 240 v

Continuous linear thermal cutouts recommended as "standard for future design"

Radiant Wall Heaters (recessed and surface-mounted)

Output per sq ft of grill opening — limited to 1,400 w

Maximum temperature in front of heater — 325 deg. Measured by radiation-sensitive "black body" placed in front

Thermal cutouts required

Ceiling Cable

Similar standardization of lengths, wattage rating steps, etc

Suggested limitation of 20 ft for longest straight run of ceiling cable

Avoid use of cable behind acoustical ceiling

Proper installation and procedures desired with dry wall construction; proper type of plaster, etc

Minor Standardization Articles

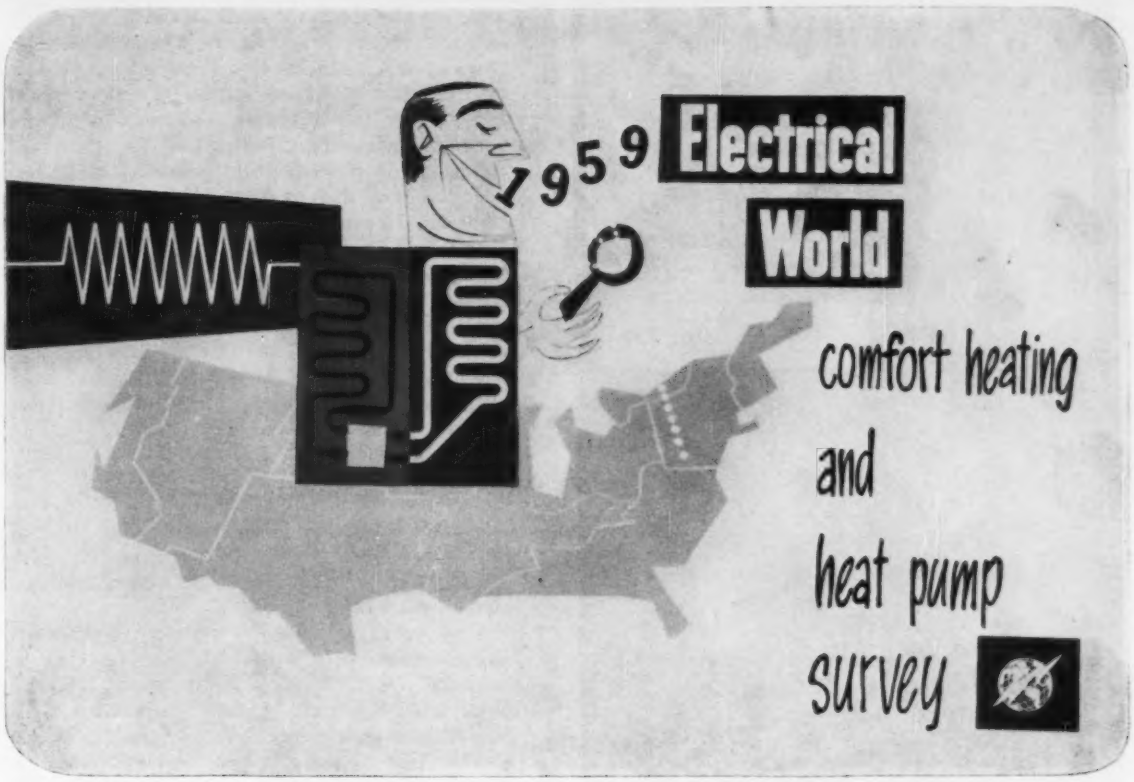
Power connections possible with 60 deg wire

Wall streaking stressed as design criteria

Floor furnaces omitted because of insignificant and declining use

Enforcement

No method deemed necessary. Labeling service to be provided for non-member manufacturers



This year's survey shows the electric heating and heat pump industry to be at . . .

The End of the Beginning

So far as electric comfort heating and the heat pump are concerned, the industry is at the end of the beginning of their development.

That, in a phrase, capsules the results—and the principal conclusion drawn therefrom—of Electrical World's 1959 Electric Comfort Heating and Heat Pump Survey.

Presented at EW's 4th heating conference in St. Louis last month, the survey had two broad aims:

- To set down, as accurately as possible, the present development of the electric heating and heat pump industries, from both the utility and manufacturers' point of view; and
- To provide a starting point from which a continuing set of national statistics might be kept.

How well the survey succeeded remains to be seen. While its figures seem to have been accepted generally by the conference-goers, the question of whether some national organization will use them as a basis for keeping tabs on the growth of the load is, as yet, unanswered.

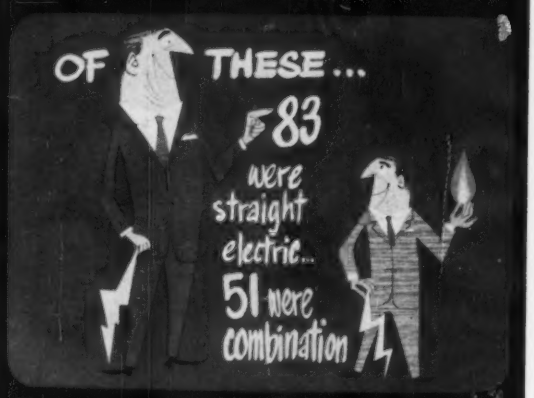
One point, however, seems certain: Electric comfort heating and the heat pump, both keystones to the industry's long-dreamed of goal of the 20,000-kwhr, all-electric home, is no longer an embryo. It has been born, accepted, and now is being nurtured carefully for a long and healthy life. The 1959 EW survey attempts to mark that birth . . .

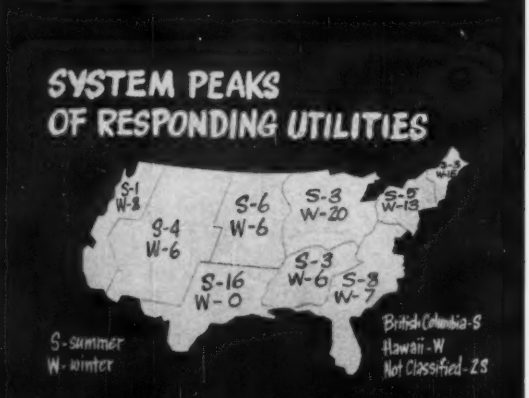
Who the Survey Covered

Survey questionnaires were mailed to some 254 utility sales vp's and commercial managers. Of these 254, 134 utilities sent back returns which were usuable in varying degrees. These 134 utilities represent some 39 million meters, or 69.4% of total U. S. meters.

So far as a breakdown of these utilities is concerned, 83 were straight electric and 51 were combination. In the preceding EW survey, published in December of 1957, of 100 reporting utilities, 82 were straight electric, and only 18 were combination. This, in itself, can be viewed as a quantitative indication of the broadening utility interest in the heating and heat pump loads.

(It should be noted that in the survey illustrations on the following five pages, totals do not





always add up to 134. This is because all returns were not usuable to the same extent.)

There are a number of utility promotional activities (not illustrated) which are of interest. Their relative merits, from the utility's point of view, is indicated by the number who use them. Breakdown:

Load studies—Exactly half the 134 utilities have conducted load studies of resistance heating and heat pumps on their systems. Of the half (67) which have not, 22 plan to make such studies in the coming year.

Heating department—Seventy-seven, or 57%, have set up separate electric heating departments.

Heating policy—68% have definite electric heating and heat pump policies for employees, customers, and trade allies.

Layouts—69 of the 134 provide layouts.

Budget billing—50 of 129 utilities offer their customers some form of budget billing.

Insulation and Thermostats Get Attention

So far as installation and application of electric heat is concerned, the two big items which utilities concentrate on are thermal insulation and some kind of thermostat control.

Most utilities have insulation standards or recommendations. Of the 129 answering insulation questions, 101 make recommendations, and—this is surprising—40 have insulation *requirements*. The overwhelming preference is for the traditional 6-4-2 combination, i.e., six inches in the ceiling, four inches in the wall, and two inches in the floors.

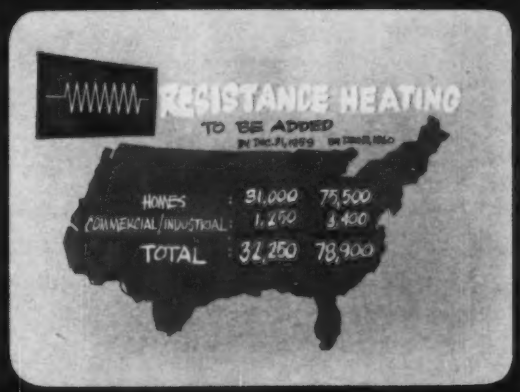
An even greater group—113 out of 129—recommend a thermostat in each room. Of these, 62% place no limit on the thermostat. Only one out of four prefers the 5-kw limit, and the balance appears to be scattered among the 3- and 4-kw limits. There does seem to be a trend toward the 5-kw limit. The number which prefer it over that which did in the last survey has increased from 13% to 28%.

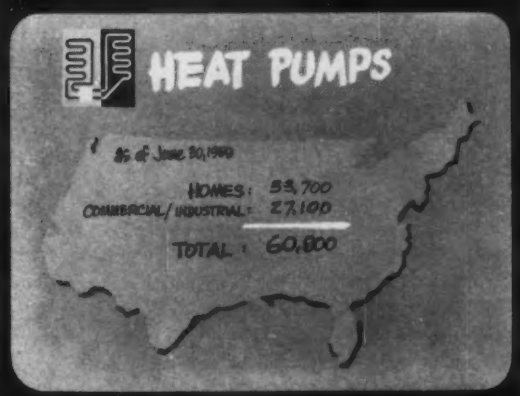
Survey Broken Down Regionally

The 1959 survey differed from previous ones in that returns were tabulated and analyzed regionally. Nine regions were used; these are the nine which EW uses to gather and analyze material for its annual statistical and forecast issues. The nine:

1. New England
2. Middle Atlantic States
3. East North Central States
4. South Atlantic States
5. East South Central States
6. West North Central States
7. West South Central States
8. Mountain States
9. Pacific Coast States.

Each region was treated separately. That is, the characteristics of each region were taken into account. For example, TVA was contacted in the East South Central region in addition to the utilities there. This made it possible to account for installations which would have been missed using only the survey returns, the form of which was designed primarily with the large utility in mind.





One of the prime factors behind utility interest in the heating load, the march of summer peaks steadily northward, is continuing. Regionally, the summer peaking situation, based on the survey returns, looks like this:

	Summer	*Winter*
New England	3	15
Middle Atlantic	5	13
East North Central	3	20
South Atlantic	8	7
East South Central	3	6
West North Central	6	6
West South Central	16	0
Mountain	4	6
Pacific	1	8

There are probably no more interesting and significant figures to the heat and heat pump promoter than those which indicate the growth of the business nationally.

How the Load Is Growing Nationally

According to the survey, as of June 30, 1959, there were 581,000 resistance heated buildings in the U. S. Of these, 548,000 were homes, and 33,000 were commercial-industrial buildings. This compares to 290,000 completely heated electrically heated (resistance only) buildings published in the EW survey in December, 1957. The breakdown among those buildings in the '57 survey was roughly 9:1 in favor of homes.

What about the future? Because of the extremely rapid growth of electric heating in the past two years, and the likelihood that this growth will be even greater in the coming ones, it was felt that predictions beyond 1960 would be of questionable value. Forecasts, therefore, were limited to the balance of 1959 and all of 1960.

Some 32,250 resistance-heated buildings will be added in the balance of 1959. About 31,000 of these will be homes, and 1,250 will be in the commercial-industrial classification.

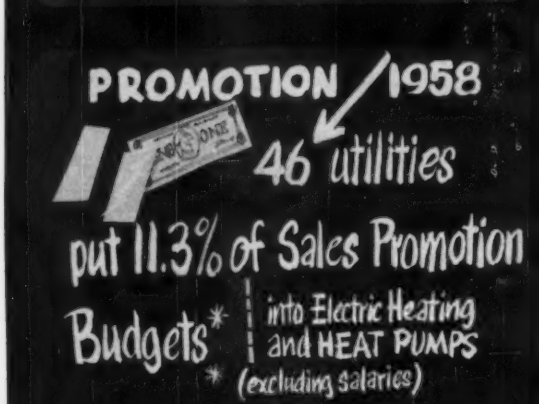
In 1960, 75,000 homes and 3,400 C-I buildings are expected to go on utility lines across the country. (A word of caution: The figures shown in the illustrations on this page, reading by Dec. 31, 1960" are not cumulative, i.e., they do not include those given "by Dec. 31, 1959" immediately next to them; they stand by themselves.

Heat Pumps 'Way Up Also

So much for resistance installations. Now what about heat pumps?

As of June 30, 1959, the EW survey indicates there were 60,800 heat pumps in the United States in the 2.5-hp and above category. This includes about 18,000 reverse-cycle room-size units, the bulk of which are in the southeastern part of the country.

The ratio of the number heat pumps in homes to that in commercial-industrial buildings is about 5.5 to 4.5. This differs considerably from that for resistance heated buildings, in which the ratio favors homes by 16:1. This is probably to be expected in view of the higher first cost of the heat pump.


PROMOTION / 1958
46 utilities
put 11.3% of Sales Promotion Budgets*
into Electric Heating and HEAT PUMPS
* (excluding salaries)

PROMOTION / 1959
52 utilities
put 14% of Sales Promotion Budgets*
into Electric Heating and HEAT PUMPS
* (excluding salaries)

MEDIA	% of utilities which use media	
	No. of utilities	percent
Newspapers	77	99
Radios	65	83
Television	44	57
Billboards	26	33
Handout literature	78	100
Car Cards	12	15
Truck Cards	24	31
NEMA Slide Film	33	42
Personal Calls	78	100
Direct Mail	76	97

According to the survey, the future of heat pumps, again only for the last half in 1959 and all of 1960, looks like this:

By Dec. 31, 1959, 18,100 additional heat pumps will have gone on the lines. About 9,600 of these will be in homes, and 8,500 in commercial-industrial buildings. In 1960 (again, in the illustrations, not cumulative) 28,000 units will have gone into homes and 22,000 in commercial and industrial structures.

The Outlook for Revenues Nationally

What kind of kwhr sales and revenues can be expected from the 1959's heating load?

Assuming the 621,000 electrically heated homes (both resistance and heat pump) will use about 20,000 kwhrs a year at an average residential heating rate of 1.8¢, then they would, if on the line all year, consume 12.5 billion kwhr, and produce $225 million.

The 70,250 C-I installations, assuming an average consumption of 15,000 kwhr, will use 1.1 billion kwhr. At an average commercial rate of 2.4¢, this means an additional $26.4 million.

Together, the residential and commercial-industrial heating loads, then, could spell revenues of a quarter of a billion dollars if on the lines all year. This is no negligible figure, particularly when it comes from such a relatively small segment of the total U. S. power market.

What about promotion? Where do utilities stand on it now?

Of the 134 utilities answering the survey, 78 of them, or 58.2% now promote resistance heating for the entire home. Of the remaining 56 which do not, 18 may promote it next year, eight definitely will, and 30 definitely will not.

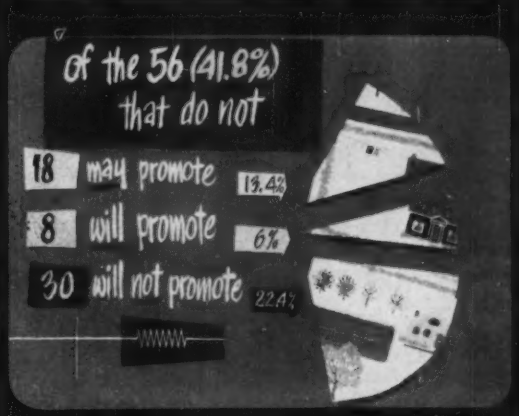
So far as the auxiliary market is concerned, the indications seem to be that a large number of the utilities are sampling it, perhaps as a guide for that future day when they will promote the complete home, or merely preferring to crawl before they walk or run. In any case, 99 of the 134 already promote electric heating for auxiliary or supplemental purposes. Of the remaining 35 which do not, two expect to promote next year, 19 say they may, and fourteen want no part of it.

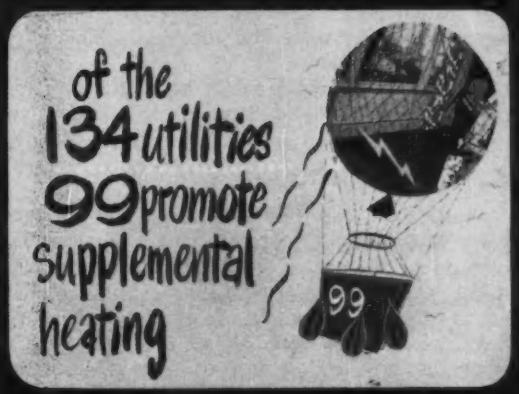
The heat pump, as is to be expected because of it greater complexity, has not reached quite so high a level of promotional acceptance. Sixty-six of 129 answering utilities already promote it. Of the 63 which do not, eight plan to push it next year.

Heat Promotion Compared to Others

What does the promotion of electric heating and the heat pump by a utility mean in terms of the promotion of other loads?

To get an answer to this question, utilities were asked for promotion budget information for the years 1958 and 1959. In 1958, 46 utilities reported an average of 11.3% of their promotion budgets, exclusive of salaries, went into heating and heat pump promotions. In 1959, both the number of utilities reporting, and the amount they spent, increased. In '59, some 52 utilities put 14% of their





sales promotion budgets into it. None of these were combination utilities.

One point turned up by the survey is that utilities have some very definite preferences when it comes to the media they use in selling heating and the heat pump. The illustration on this page shows this.

Personal calls—the old door-to-door salesmanship—is still the best way to sell, say the utilities. Of 78 responding, all of them use the personal call.

However, they pre-sell their prospects in two common, but apparently effective, ways. All use handout literature, and all but one of them reports using newspaper advertising. In addition, almost all of them (76) use direct mail, usually bill enclosures.

Next in the line up of media favorites is radio, with 65 utilities (83%) using it. Television is used by 57 of them.

The NEMA slide film, made several years ago, is used by 33 utilities. About the same number which employ billboards also use truck cards (26); car cards run a poor last with only 12 utilities using them.

Trade Allies Are Important

One means of promotion no utility can really afford to overlook is that of establishing good working relationships with its trade allies. So far as electric heating and the heat pump are concerned, an increasing number of the power suppliers are realizing the importance of the architect and the consulting engineer, especially in the commercial and industrial markets. For example . . .

In sampling 129 utilities, 97, or 75%, said they worked with local architects in promoting heating. As in their approach to the customer and the general public, they seem to prefer the personal call. Eighty-four report using it. About 53 utilities of them also approach the architect and consulting engineer via direct mail. Only about a third of them use specification sheets. A large number of utilities, 88 in fact, have held or plan to hold a special electric heating and heat pump symposium for architects and engineers.

One means of promotion that utilities might explore further is the electric heating show or exposition. Of 129 utilities, only 24 have held such a show. The effectiveness of these expositions, especially as a medium for introducing the entire subject of electric heating to an area, is well known. Slightly less than half the utilities devote lobby and office floor space to displays of resistance equipment, and 44% devote it to heat pump displays.

Rates Also Need Attention

Survey returns indicated that rates—a traditionally sensitive subject in the utility business—may not have received as much attention as they deserve.

Of 129 utilities, 72 sell electric heating at the same rate as their lowest residential rate. Fifty report having a special rate . . . and this seems to be the trend. Everything points to an acceleration of this trend. The residential demand, so far as heating is concerned, is out the window. As one long-time sales vp put it, "It's foolish and obstructionist for anyone pushing heating and the heat pump."

Of some 78 utilities responding to questions concerning rate structures . . .

- Only 1/20th sell it at more than 2¢;
- Less than a 1/5 sell it for 2¢;
- 44.9% sell it for something between 1½¢ and 2¢; and
- Almost ⅓ have gotten their rates down to less than a penny and a half.

Heat Revenues Compared to Others

While an estimate of total heating and heat pump revenues nationally has already been made, it is perhaps more dramatic to illustrate the effect of heating customers' revenues compared to that for non-heating ones. A departure was made in this survey from previous ones to include a set of questions which might be used to determine this effect. It was expected that on few, if any, utilities would supply the requested information. Only 40 did supply it.

In 1958, these 40 utilities, with an average heating saturation of a mere 0.098%, produced heating and heat pump revenues that were 0.68% of total revenues. This means that each such customer in 1958 was producing about seven times as much revenue as the average of all the non-heating customers.

Now, what about 1959? For the first six months of this year, these same 40 utilities, among which the average saturation had risen to 0.1%, had their heating and heat pump customers produce 0.835% of total revenue. Putting it another way, these heating customers in 1959 on the average produced more than eight times the average revenue of all non-heating customers.

Actually, these ratios might be short, since total revenues include those from large industrial customers.

Competition Is No Deterrent

While there exists no measure of utilities reluctance to promote the heating and heat pump load because of a seeming inability to complete effectively, the majority of utilities which do promote are not backing down because of rough competition from gas and oil. Some 96 of them say they are competing well against 55¢ to 75¢-per-Mcf natural gas. And 86 report making headway or holding their own against No. 2 oil in the 16¢-per-gallon range. They are doing it by treating electric comfort heating and the heat pump as the "Cadillac" of the heating business . . . by selling the advantages that more than make up for any difference in costs, where such differences exist.

And it seems to be going well enough to mark, for electric heat and the heat pump, merely the end of the beginning of this acceptance.

REPRINTS

Reprints of the report on EW's 4th Electric Comfort Heating and Heat Pump Conference and the 1959 Survey, along with complete conference proceedings are available at $10 *the set.*

Light Planes Spot R/W Encroachment

G. T. ROBBINS, Superintendent of Transmission, Virginia Electric Power Co, Petersburg, Va.

Aerial patrol has revealed hitherto difficult-to-discover encroachments on Virginia Electric & Power Co transmission-line rights-of-way.

Patrol planes have spotted building foundations under construction either wholly or partially within easements, such information enabling the company to warn off property owners before too large an investment had been made.

Such hazards are often discovered earlier by air patrol than by foot patrols. Yet, as used by VEPCO, aerial patrol supplements rather than replaces foot patrol. It was adopted in order to complete four system inspections a year, made difficult by a manpower shortage. This year six aerial and two foot patrols will be completed in addition to special and emergency aerial inspections over VEPCO's 2,454 circuit miles of 66, 110, 132, and 230-kv lines.

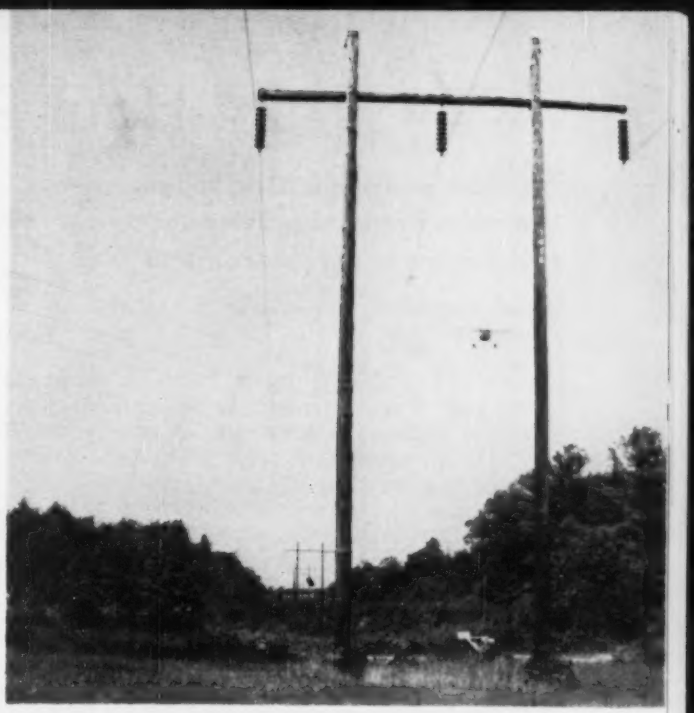
Aerial patrol was introduced with the signing of a contract with a Richmond, Va., air service for the assignment of a fixed-wing plane and an observer. The contractor's observers have proved most proficient. Although some utilities use helicopters, VEPCO has stayed with its original choice of planes which, study shows, operate at about a quarter of the cost of helicopters.

Routine aerial inspection of the VEPCO system takes at least 30 days, about 81 hr of actual flying time. But a fast, higher-altitude patrol, employed after Hurricane Hazel, was able to determine what lines were clear in just one week. Foot patrol would have taken 15 man-months.

Aerial reports have helped in averting several instances of serious trouble by getting information to line crews quickly. Once, when a crossarm had split, a 66-kv conductor was observed swinging freely only some 10 ft above ground. Immediate action by line crews, once warned by plane patrol, undoubtedly prevented an outage and probably saved lives.

Again, when a 110-kv line had been struck by lightning, a newly installed crossarm was split and other crossarms and poles damaged. First inclination was to disregard this report because of just-completed repairs, but ground inspection revealed that this line section required immediate replacement.

While aerial patrol does not solve all VEPCO's line-inspection problems, it is becoming increasingly important. When properly supplementing necessary foot patrol, it helps to optimize transmission-line maintenance. As a recent study shows, an average aerial report revealed 257 broken insulators, 154 right-of-way encroachments, 57 defective crossarms, 86 chipped insulators, 13 defective poles, one conductor burn, and 491 miscellaneous irregularities. These discoveries were made during inspections over 2,428 circuit miles.



AERIAL PATROL supplements foot-patrol on VEPCO transmission line, proving useful where access problem is acute

AUTO GRAVEYARD is spotted by aerial patrol encroaching on H-frame transmission-line right-of-way outside town

24-Hour Power Aids Peruvian

Standard of living is rising rapidly; novel installations overcome problems of climate and architecture in agricultural area

JOHAN MEULENBELT, Acting Manager, O.G.E.M. Peruana S. A., Lima, Peru

An expanded, 24-hour supply of electric energy has made some startling transformations in the daily life of Piura, a Peruvian agricultural community. Small industries are springing up, and the leading hotel has installed air conditioning.

Until this year, the growth of this town of 70,000 had been hampered by limited electric service; power was furnished only during the twelve night hours. Now, a street lighting system with fluorescent and mercury vapor lamps is being installed. Multistoried buildings are possible because elevators can be used, and the first 9-story building will be finished soon.

To alleviate power shortage problems throughout Peru, the Peruvian government has created a favorable atmosphere for foreign companies to install power systems in communities. Accordingly, the Overseas Gas and Electricity Co of Rotterdam, Holland, constructed a diesel plant and distribution network for Piura.

The presence of oil fields and the lack of hydroelectric power led to the construction of a diesel plant. At present, the plant includes two 1,360-kw units. Within the next year a third unit will be added, bringing capacity to 4,000 kw.

Local climate dictated several design innovations. A cooling tower is used, and a variety of temperature and pressure controls keep the engines in constant operation. The latter features also eliminate the danger of maladjustment by still-inexperienced local labor.

Except for the erecting engineer of the engine factory and the supervising plant engineer, the job was done by local labor. As the area is predominantly agricultural, skilled labor was rare. Fortunately, however, the people responded very well to instructions and the plant was switched on the line 11½ months after ground was broken.

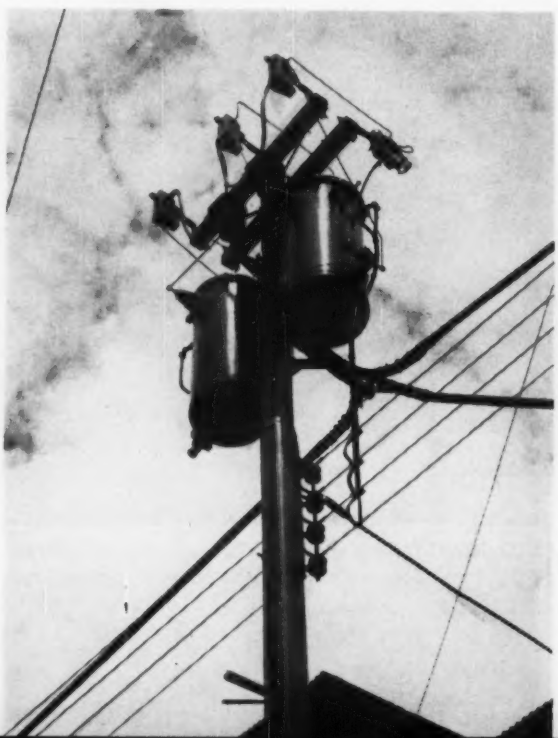
After an extensive study, the American standard distribution system with 4,800-v primary voltage was chosen. Because of the low economic level of the majority of the population, it was essential to keep investment at a minimum. For this reason, all-aluminum construction was selected.

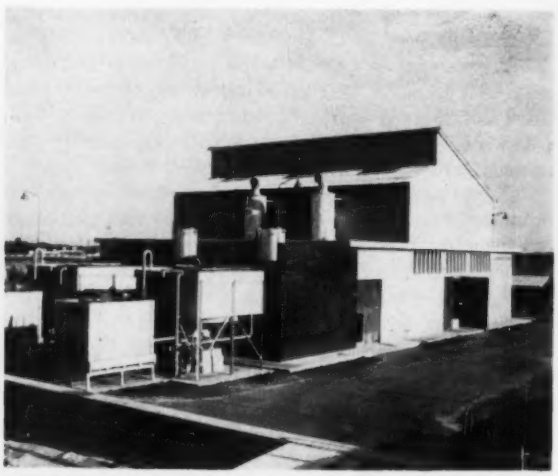
The main primary circuit consists of a loop of 3/0 ACSR conductors, fed by three feeders of the same size. Branch lines are No. 2 ACSR, and secondaries range from No. 4 to 3/0 all-aluminum.

The business center of the city has streets only 20 to 30 ft wide, making open wire construction extremely difficult. Therefore, extensive use is made of aerial cable. The cable used is a European type with three conductors enclosed in a polyvinyl protecting cover, which also includes the messenger. A similar type of cable is used for service drops.

To reduce pole and insulator costs, the 35-ft class 5 poles which carry both primary and secondary lines are spaced 240 ft apart. As this is too great a distance for the all-aluminum secondary wires, 25-ft class 7 poles are spaced between the 35-ft poles. The 25-ft poles carry only secondaries and street lighting.

The presence of balconies and overhanging roofs, often of the same width as the sidewalk, provided a design challenge. The problem was overcome by bending the top 5 ft 6 in. of the 35-ft steel poles at an angle





DIESEL PLANT provides generation with two 1,360-kw units. A third will be added to supply rapidly-increasing loads

CLEAN CONSTRUCTION is achieved by using aerial cable for primaries, service drops. Cutouts protect transformers

Community

of 30 deg with the horizontal, forming a kind of alley arm. A clamp is welded to the top to carry the aerial cable. Any type of fluorescent, mercury vapor or incandescent street light fixture can be mounted at this point. Inside the bend of the pole, a 1½-in. tube is welded to serve as an outrigger rack for the secondaries.

Distribution construction was especially difficult in the center of the city because of a spider web of old lines and telephone cables. Under the supervision of one electro-technical engineer, assisted by a local contractor, nearly 1,000 poles were placed and 10 miles of primary and 25 miles of secondary were installed within 10 months.

Installation was aided by using a two-ton power wagon on which a posthole digger had been mounted. A trailer was used for transportation of poles and cable reels. In difficult terrain, the power wagon went in alone, pulling the trailer in afterwards with a winch.

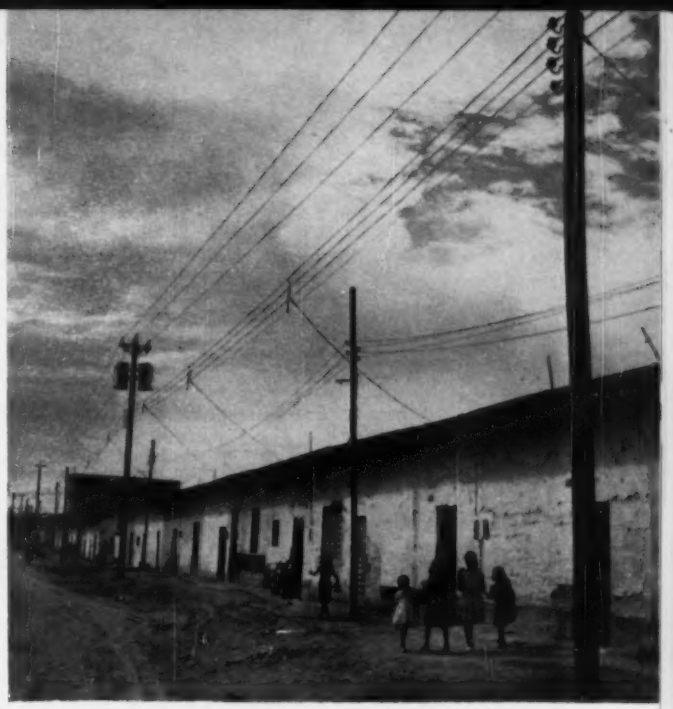
Renewal of old house connections also posed a problem. Most houses are constructed of adobe. Many are plastered with gypsum, but many have no plaster. This made it impossible to fix meters on the wall. Sheet iron boxes, which hold the meter and the fuses, were built and grouted into the walls. This permitted flush mounting.

The service entrance voltage in Peru is 220 v, 3-wire. Transformers are center-tap grounded.

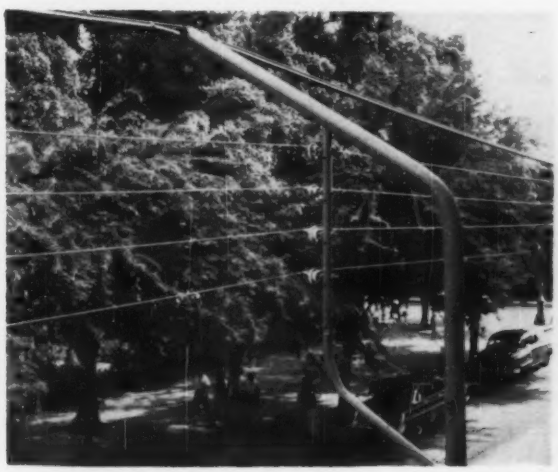
To conserve the service entrance cable, midspan taps were used extensively. Line spacers, designed by the author, were used in these situations. The spacer is made of plastic tubing with a simple locking device for the wire.

During the line construction, the new service entrances were installed. When the power plant was completed, power was supplied from the new transformers to the old secondaries. Gradually, each street was cut over with a minimum of service interruptions.

Because no service had been available in daylight hours before, the first week the day load was only about 150 kw. Within six months this had reached 500 kw and is rising rapidly. In the same period the evening load increased from 800 to 1,200 kw.



SHORTER POLES for secondaries are between primary poles. Picture was taken before older secondary poles had been removed. Midspan taps are used extensively



OVERHANGING BALCONIES are avoided by using bent steel pole. Primary cable is secured at the top of the pole

LINE SPACER designed by author is used to make midspan taps. Service drops are concentric polyvinyl aerial cable

RUSSIAN POWER was subject of J. L. Singleton (right), W. M. Shepperd, Arkansas P&L, told of sales events

R. T. PERSON (left) succeeds J. E. Wilson (right) as president of the Rocky Mountain Electrical League

Holds Power Cold-War Weapon

RMEL speaker disputes some Soviet statistics on generation at Colorado Springs meeting which elects R. T. Person

Power generation is of prime importance in Russia's economic war with the West, J. L. Singleton, Allis-Chalmers Mfg Co, recently told the Rocky Mountain Electrical League's Annual Meeting at Colorado Springs, Colo. The meeting elected R. T. Person, Public Service Co of Colorado, president for 1960. He succeeds J. E. Wilson, Colorado Central Power Co.

Although Russian statistics show total generating capacity of 48 million kw, they are inconsistent and should be reduced probably to 30 million. Either figure must stand comparison with 160 million kw total for the U. S. at 1958's end.

Russia has a program for increasing generating capability by 60 million kw in the next seven years. But U. S. estimates of Russian manufacturing capacity indicate that it will take them about 17 years to reach their goal, said Singleton. There is a definite trend in favor of the fossil-fuel steam power plants.

Commenting on his tour of Soviet manufacturing and utility plants last year, Singleton said that workmanship and quality of materials do not measure up to U. S. items. They are 25 years behind us in steam turbines, transformers, motors, but not in hydraulic turbines, he said.

During a recent visit to the Allis-Chalmers Milwaukee plant, 12 members of Russia's electric power exchange group, he said, seemed impressed with capacity of the shops and the high quality of workmanship. Good housekeeping and safety precautions were of interest, but the question asked over and over again by the Soviet visitors was: "When will we be able to trade with you?"

As long as we can maintain free enterprise, we will maintain our industrial and agricultural superiority over Russia, said Dr. Nicolas Nyaradi, Institute of International Studies, Bradley University. Unfortunately the American people have a tendency to vote their way into socialism.

Hits Cash Register View

The greatest threat to free enterprise in the utility industry comes not from organized public power groups but from advocates of free enterprise who say power is a necessity that should be treated differently. Most to be feared is the group that has sampled the cheapness of public power and liked it, said A. S. King, EEI president.

If the Hoover Committee recommendation to sell off TVA facilities to neighboring utilities were adopted, strong objections would come from private enterprise with plants in the area. The cash register approach is all too prevalent, said King.

The electrical industry must tell people what it is doing for them in terms of service, said Dr. Kenneth McFarland, General Motors Corp. Organizations such as RMEL must launch a constructive effort as never before, he said.

Long fuel life, reduced capital costs, and high overall efficiency favor high-temperature gas-cooled reactors for power plants, said C. A. Rolander Jr, General Atomic Division, General Dynamics Corp. The 40-Mw prototype to be built and operated on the Philadelphia Electric system cannot be expected to produce competitive power because its capital cost will be on the order of $500 per kw. But overall cost for a later 150-Mw plant is expected to be 8 or 9 mills per kwhr.

The HTGR concept permits the pressure vessel power density to be increased about 20-fold, compared with typical natural uranium, gas-cooled reactors. Thus the reactor vessel can be held to small size and low cost. Inexpensive structural metals can be used because the reactor is designed with concentric piping so all pressure-containing surfaces are exposed only to the low (660F) inlet temperature of the gas-coolant, he said.

The project, said Rolander, has the support of 52 utility companies serving 33 states, under the name High Temperature Reactor Development Associates Inc. Metallurgical studies sponsored under the program have uncovered completely new fuel-element materials which may operate at surface temperatures

(*Continued on page* 95)

DISTRIBUTION

Equipment News

J. L. ELROD, Manager — Marketing, Distribution Transformer Department, introduces the new pad-mounted transformer.

NEW Pad-mounted transformers for residential underground systems

Plus . . .

- ***NEW*** simplified-design distribution transformers through 500 kva
- ***NEW*** Nitrile gasket seals on network transformers
- ***NEW*** corrosion-resistant transformer finish for seacoast installations

GENERAL ELECTRIC

NEW Pad-mounted transformers for suburban areas

To meet the ever-growing trend toward underground distribution systems in suburban areas, General Electric has developed a new pad-mounted distribution transformer.

General Electric's double-ended design is unique in that it has separate compartments for the high- and low-voltage terminals. This makes servicing easier and provides maximum safety for maintenance personnel.

Available in single-phase ratings from 25 to 100 kva, the unit presents a compact, attractive appearance that easily blends into neighborhood surroundings.

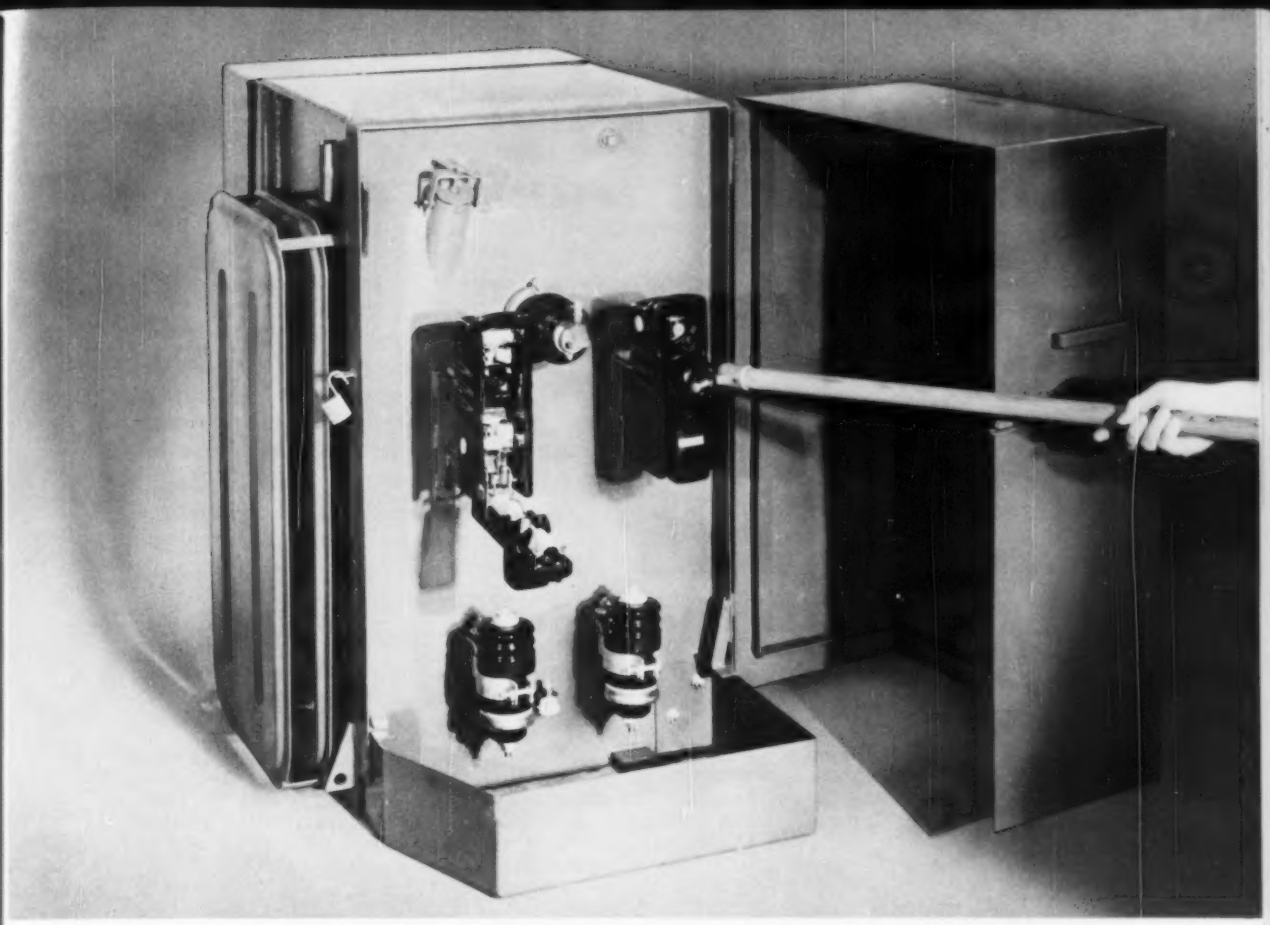
An outstanding safety feature of this new transformer design is the *positive visual* indication of the circuit condition provided by the two solid-blade load-break cutouts. When a cutout is open, the lineman has visible proof that the cable loop is completely isolated from the high-voltage source.

IMPORTANT NEW FEATURES OF G-E PAD-MOUNTED TRANSFORMERS

Simplified Installation — General Electric's pad-mounted transformers are the smallest, most compact transformers of this type available. In addition, all ratings of G-E pad-mounted units fit on the same size pad, with the same terminal connections. These features greatly simplify installation and allow future uprating with a minimum of time and expense.

Ease of Service — The high- and low-voltage components are contained in separate compartments on opposite ends of the transformer. Maximum use is thus made of available space, providing plenty of room for making connections or performing routine maintenance.

Accurate Service Reconnection — The bushings contained in the low-voltage compartment of pad-mounted units have two removable copper busses which are standard for all transformer ratings. Transformers can therefore be changed out to larger ratings without removing individual customer service connection from the busses — eliminating possible reconnection errors.



HIGH-VOLTAGE end view of a new 100-kva G-E pad-mounted transformer shows roomy compartment. One enclosed cutout is in open position. Second cutout is being opened with switchstick. This switching method clearly shows when unit is isolated from high voltage. Device at upper left holds high-voltage fuse. Two lightning arresters, optional equipment, are shown at bottom. No special housings or fences are required to make units tamper-proof.

Semi-buried transformer enclosures

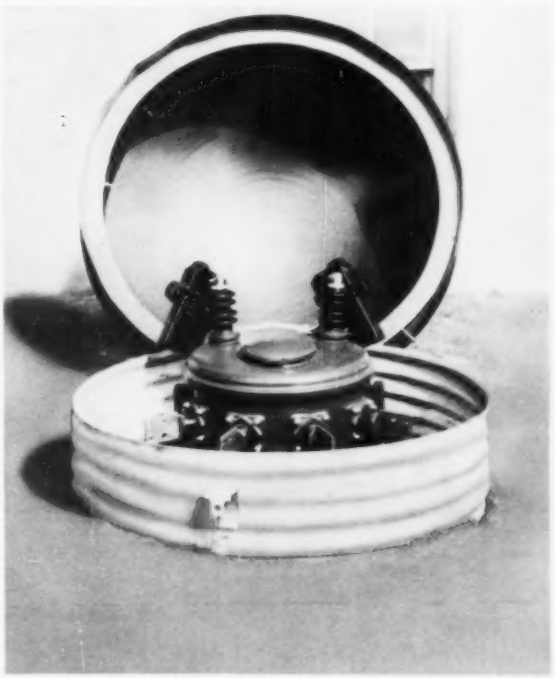
General Electric's semi-buried distribution transformer enclosure provides a safe and economical method of supplying power to modern pole-free residential developments.

The enclosure accommodates standard pole-type transformers through 167 kva, with plenty of room left for adding disconnects. Thus, linemen experienced in overhead system practices can easily make connections. General Electric's semi-buried installation can also be easily uprated by merely replacing the transformer.

The 54-inch diameter enclosure is designed for mounting on 48-inch corrugated culvert pipe. The hinged cover projects only 33 inches above the ground.

Vent openings are completely baffled for safety of children and for the protection of the transformer against small animals. The all-steel enclosure easily withstands the rigors of field installation and the onslaught of neighborhood children.

GENERAL ELECTRIC



NEW G-E 333 and 500 KVA distribution transformers

Simplified-design transformers replace station-type construction

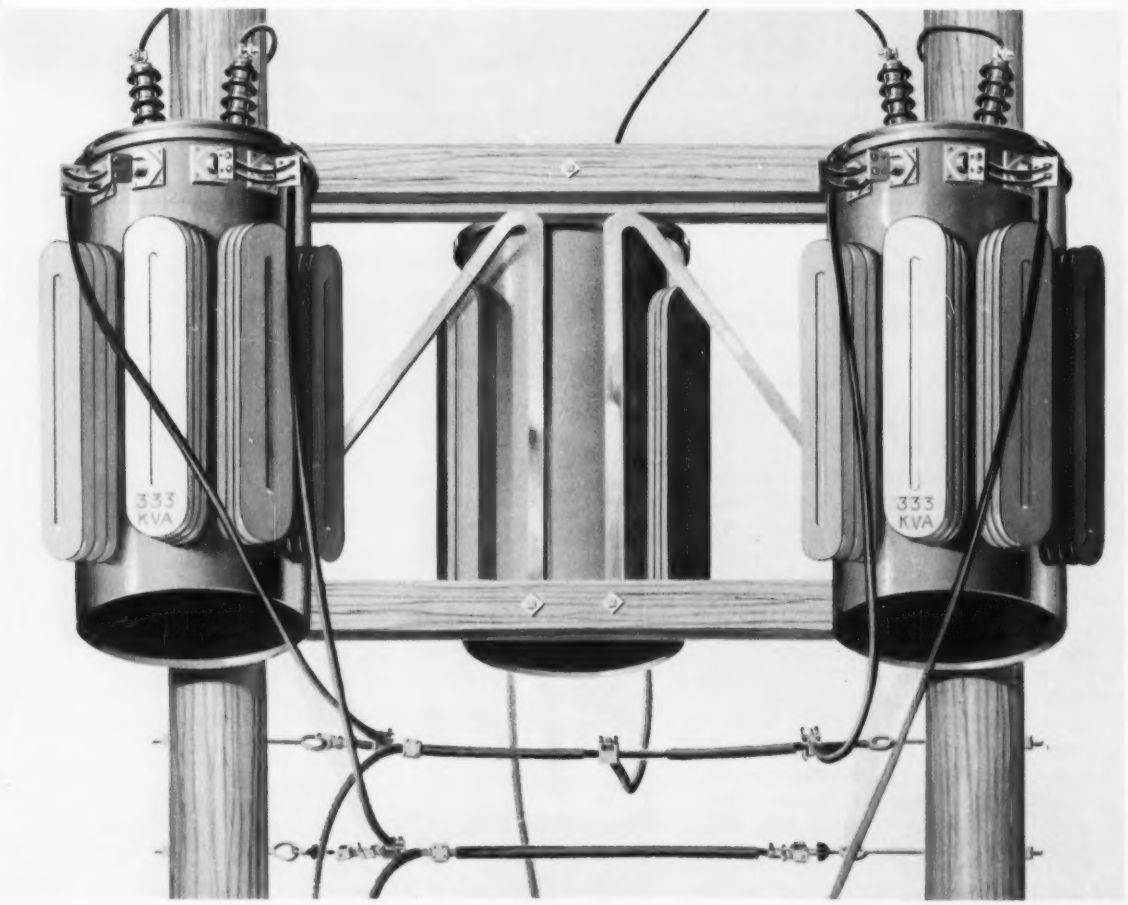
A complete line of General Electric simplified-design distribution transformers is now available through 500 kva. The new 333- and 500-kva ratings stem from an extension of G-E design techniques which previously resulted in the 167- and 250-kva pole-type units. This complete line of simplified-design transformers replaces former station-type units in these higher kva ratings.

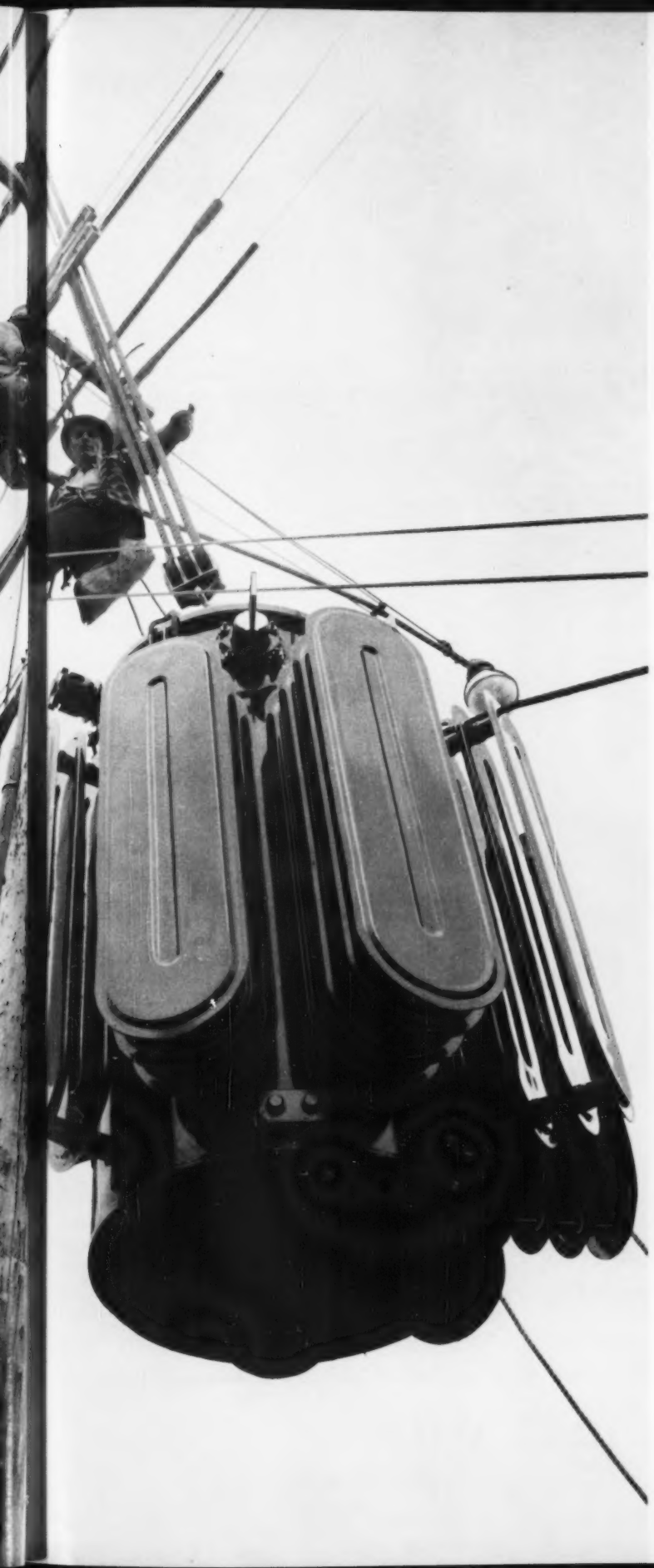
The new transformers retain all of the operating advantages of the former station-type design, yet provide significant savings to users through lower initial price and reduced installation cost.

The new G-E simplified-design units are available in single- or three-phase ratings. They replace station-type transformers having primary voltages below 15 kv.

GENERAL ELECTRIC

ARTIST'S ILLUSTRATION shows new approach to serving 1000-kva three-phase loads such as shopping centers or small industrials. Three new General Electric simplified-design 333-kva single-phase transformers shown below replace larger, heavier, more expensive station-type transformers.





Why We Developed These New Ratings

by

J. O. SWEENY, Manager — Product Planning, Distribution Transformer Department

Distribution transformers in ratings through 500 kva have long been classified into two general categories—pole type and station type. Only ten years ago, station-type units were predominantly for substation application. Illustrative of this, in 1949 over 70 percent of transformers purchased in the range of 167 through 500 kva had primary voltage ratings above 25 kv and secondary ratings above 2 kv. Today, over 80 percent are purchased for stepping down from distribution voltages below 15 kv to utilization voltages such as 240/480 volts. This change in application implies a lesser need for accessories which are standard in substation service. Also implied is a need for more versatile mounting arrangements.

Some time ago, the 167-kva transformer became a pole-type unit. More recently, the 250-kva rating was redesigned along pole-type lines. These changes have received enthusiastic acceptance. It is evident that the time has come for extending these benefits throughout the range of distribution transformers. In recognition of this, both the 333- and 500-kva ratings are being offered without station-type accessories. In addition, the 333-kva rating has been redesigned as a lighter-weight, more compact unit suitable for pole or platform mounting. A similar redesign of the 500-kva rating is underway.

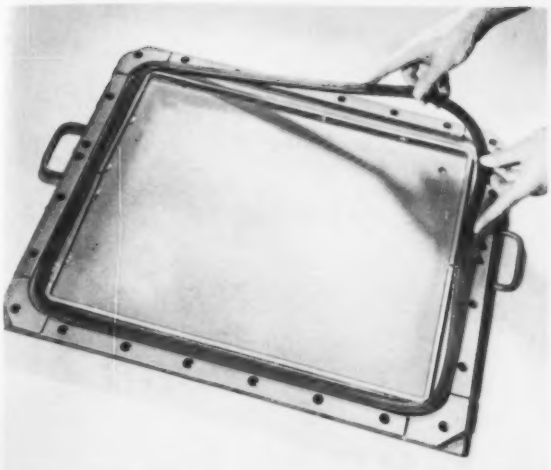
These changes, applied to both single- and three-phase transformers through 15 kv and 500 kva, establish a compatibility between equipment and application requirements. Advantages include cleaner designs, dollars savings in both first-cost and installation costs, and greater versatility of mounting. The same high standard of reliable performance associated with General Electric's small distribution transformers will be maintained in this new larger distribution transformer line.

GENERAL ELECTRIC

SEALING ARRANGEMENT on h-v terminal-chamber cover of a 500-kva vaultmaster transformer is pointed out by E. N. Decker, Jr., G-E network transformer design engineer.

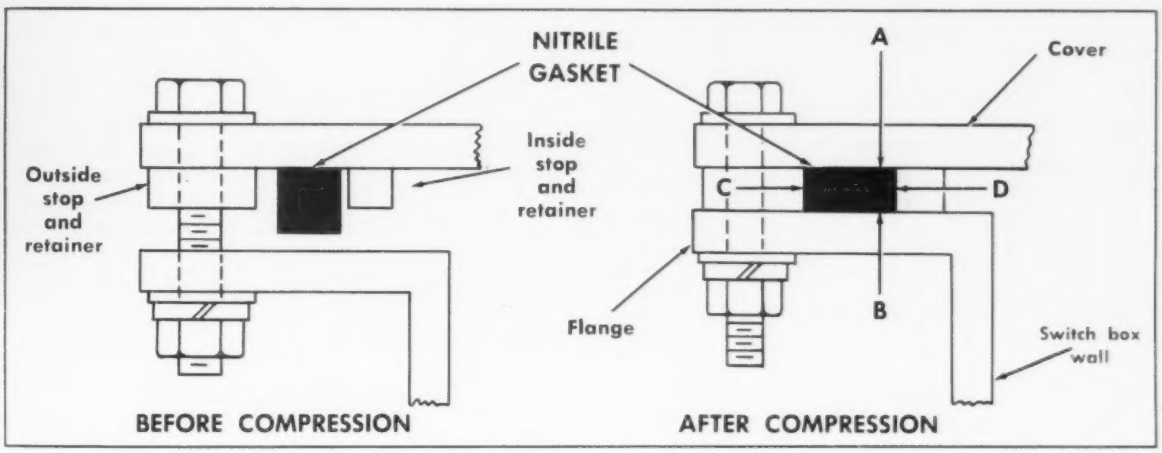
NEW . . . Nitrile gaskets for network transformers

Nitrile gaskets now used on both high- and low-voltage ends



REUSABLE NITRILE GASKETS provide tight, lasting seal and do not require cementing, simplifying routine maintenance.

LOW-VOLTAGE THROAT has a milled groove that acts as a retainer and stop to assure proper gasket compression.



HIGHLY EFFECTIVE SEALING of h-v compartments on General Electric network transformers is provided by this special gasket and retainer arrangement. When covers are bolted tight, proper size and spacing of stops and retainers assure constant, pre-determined back pressure of Nitrile rubber gasket against surfaces A, B, C, and D.

Nitrile rubber gaskets are now used on both the high- and low-voltage ends of General Electric network transformers. Nitrile gaskets provide a tight, long-lasting seal. These gaskets, when properly "contained" and "stopped" are superior to other gaskets in sealing ability. Since they do not take a permanent set like cork or cork-rubber gaskets, they can be used repeatedly. Cement or other adhesives are not required. And, Nitrile rubber gaskets last longer because they do not deteriorate with age in this self-sealing design.

A special groove, milled into the low-voltage throat, and special "stops" on the h-v switch cover and terminal-chamber cover firmly hold the gaskets in place.

Savings in installation costs and maintenance, as well as reliability against leaks, are assured with this sealing arrangement.

GENERAL ELECTRIC

NEW Corrosion-resistant transformer finish for seacoast areas

General Electric now offers a distribution transformer with a special finish for highly corrosive atmospheres. These special units for seacoasts, chemical plants and other corrosive areas are available in standard pole-type ratings through 167 kva.

To combat tank corrosion, a Melalast* finish is applied to the entire exterior of the transformer. This effectively seals the metal finish and prevents corrosion. Even in the event that this Melalast finish is chipped — highly unlikely with this tough new coating — the exposed pinpoint area will not spread, and there will be no underfilm creepage which is so damaging to painted metal.

* Trademark of General Electric Company

Current General Electric bulletins you can use

Distribution Equipment for Residential Underground Systems — GEA-6981

10 Reasons Why General Electric Is Your Best Transformer Buy — GEA-6070

Self-protected Distribution Transformers — GEA-6126

Vaultmaster Network Transformers — GEA-5024

For complete details on these important advances in distribution transformers, contact your General Electric Sales Engineer. For copies of these bulletins, write to Sect. 431-88, General Electric Company, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

RMEL Meets

(*Continued from page* 86)

twice those contemplated for use in present reactor systems. Direct conversion of heat to electricity has been demonstrated in the laboratory at 15% efficiency, but scientists believe that 40% efficiency can be attained, said Rolander.

Twenty years hence the average home will use 28,000 kwhr yearly compared to 3,300 last year and 840 20 years ago. Yet the residential load curve is beginning to level off, said Dr. J. A. Hutcheson, Westinghouse.

The refrigerator, freezer, dishwasher and range pour heat into the house which the air conditioner strains to remove, Hutcheson continued. He suggested that new homes incorporate a central core unit with replaceable modules for cleaning clothes, washing dishes, cleaning rooms, cooking food, and functions not yet conceived. The electric heating sub-unit would be reversible and would handle all refrigeration.

The U. S. can deal most effectively with inflation by more vigorously pursuing four policies which have produced partial success during the Eisenhower administration, said Sen Gordon Allot, (R, Colo.). These policies, he said, are:

- Balancing the federal budget.
- Sticking to wise and flexible monetary policies that avoid "easy money" and artificially rigged interest rates.
- Sound labor-management agreements based upon free collective bargaining, the government keeping its hands off.
- A firm national resolve to keep price levels stable.

A consistent program of monetary and fiscal management is clearly needed to attain stable prices, said J. K. Busby, Pennsylvania P&L. Stability of price levels should be the goal of national economic policy.

New vice presidents are: P. E. Brookover, Cheyenne Light, Fuel & Power Co.; Neil Simpson, Blackhills P&L Co.; Warren A. Terry, Home L&P Co.; and W. L. Duncan, GE Supply Co. Ralph B. Hubbard, manager, will retire in January 1960 after 15 years with the league and 46 years in the utility industry. B. P. Montagriff, Public Service Co of Colorado, will succeed him.

PATHFINDER NUCLEAR PLANT MODEL interests C. H. Whitmore, Iowa-Illinois G&E; E. M. Raun, Iowa PS; N. B. Gusset, Iowa P&L; Harold Mann, Iowa Southern Utilities, and M. L. Kapp, Interstate Power, who attended St. Louis meeting

Tells Business: Get in Politics

Get into politics now to save yourselves! Howard Elliott, St. Louis attorney, urged the 12th Annual Management conference of the Utility Companies of Iowa recently. Elliott, a Republican and former speaker of the Missouri House of Representatives, said "For 25 years it has been good politics to be anti-business."

The businessman, he said, can no longer afford to ignore the fact that he is permanently in the political dog house.

For businessmen Elliott spelled out these commandments: Don't be afraid; have your own political convictions; unite your efforts; forget not your enemies; carry the ball for your congressman and representative, not just with cash contributions, but by introducing him to your friends and interpreting his actions to them so that he will carry the ball for you.

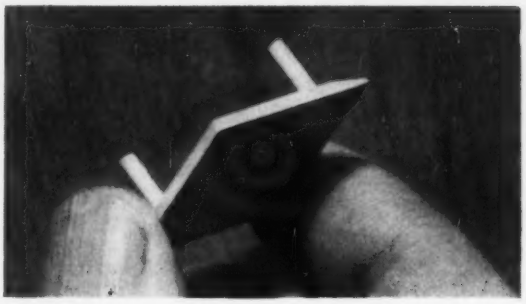
A panel of utility executives, discussing "Political Action by Businessmen" agreed that the business community must get into politics now. The panel consisted of Charles H. Whitmore, president, Iowa-Illinois Gas & Electric Co; Milton L. Kapp, president, Interstate Power Co; H. L. Mann, president Iowa Southern Utilities Co; and N. B. Gussett, chairman of the board, Iowa Power & Light Co.

The electric utilities are under their greatest attack from those who would attempt to socialize the power industry at a time when there seems to be the least reason for it, said Allen S. King, president, Edison Electric Institute, and Northern States Power Co. King urged utilities to take their stories to the Main Streets of the communities in which they operate, where they have acceptance. He said the job cannot be done at the national level. He also proposed that utility company executives assign one man to the job of educating employees, stockholders, and the public on "the simple facts of our business."

Harold F. Smiddy, vice president, General Electric Co, told the conference that decision making will have to be decentralized, right down to the man closest to the work. The need for this decentralization of decision making is being forced by automation which takes over much of the physical work but multiplies the mental work. The plant worker gives way to the trained operator of expensive and complicated machinery.

Community modernization is at work in our society but needs a rallying point, R. J. Sargent, vice president, Westinghouse Electric Corp, told the conference. The utility companies, he said, are a logical spearhead for a drive to beautify and modernize run-down neighborhoods. If Iowa utilities were to promote this idea, back it with advertising, pull all the forces in the community into it, a tremendous job could be done, said Sargent.

Plastic Squares Simplify System Board Changes



Small plastic squares make the rearranging of diagrams on the load dispatcher's board a very simple matter for City Public Service Board of San Antonio, Texas. The board in the dispatcher's office is of Formica with holes uniformly spaced. The system one-line diagram and all system operating information are put on the board by inserting 1-in. square plastic pieces as required.

Fronts of the squares show the switch symbols, line symbols, lights, or any codes or designations used by the Public Service Board. Pieces with blank fronts also are used.

On the backs of the plastic squares are small fingers about 1-in. long. These fingers are molded as part of the square and fit snugly into holes in the Formica backing of the board.

To show changing system conditions, the dispatcher can take out the plastic squares and rearrange them quickly with a minimum of effort. Changes can be made without the use of any tools.

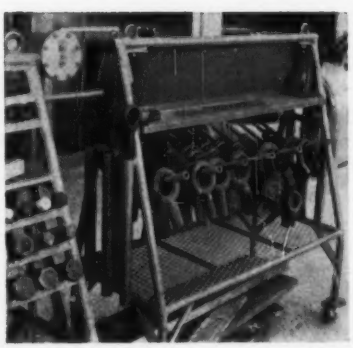
Racks Hold Parts During Turbine Overhaul

Portable racks for parts and tools are a useful and convenient means of keeping all items together during inspections and overhauls of steam turbines. Racks of the type illustrated were designed and built by the opertors of the Riverview Plant of Southwestern Public Service Co, Amarillo, Texas.

A rack for eyebolts consists of scrap pipe welded to make a suitable frame, hooks and holders. A tray at the top was made of $\frac{1}{16}$-in. plate; a bottom tray is made of expanded metal. Another rack, also made of scrap pipe, has slanted shelves of expanded metal to hold turbine casing bolts. Similar racks have been built for shovels and tools.

Each rack has two eyes welded to the top member to allow lifting by crane. Racks are mounted on 3-in. castor wheels.

(*More Methods on page* 98)



UTILITY VS. FUTILITY

Ever look up Webster's definition of "utility"? Look: "1) Quality or state of being useful. 2) Power to satisfy human wants. 3) Happiness; the greatest good or happiness of the greatest number. 4) A useful thing."

In fair weather, it's easy to supply power to satisfy human wants. But the conscientious power man can get a nervous breakdown when storm or wind, snow or sleet disrupt service . . . fails to supply human wants just when they're needed most. Lightless lights, cold furnaces, silent refrigerators to say nothing of shut-down industrial plants and business firms don't help your public relations program one bit.

You can save yourself a lot of grief by using VICTOR Suspension Insulators. They're designed right. They're made right. They're rigorously tested with the industry's most modern testing equipment. Specify VICTOR Suspensions for *your* lines. It's a safe way to assure continuity of service in times of emergency.

BAPTISM OF FIRE

Every VICTOR Suspension shell receives a "baptism of fire" to make sure it measures up to VICTOR standards of quality and performance. After Suspension shells come from the kilns, every one is individually subjected to high voltage flashover tests on a VICTOR-designed continuous tester. Each must stand up under these electrical tests before being eligible for assembly. After assembly, each completed insulator unit is mechanically pulled *and* again subjected to electrical test, this-time to high frequency and 60-cycle flashover. These stringent, individual tests mean greatest assurance of continuous performance—greatest possible protection for your lines.

OLE DAN'L BOONE HAD NOTHING ON US!

We've done a bit of pioneering, too. Not so long ago, either, although a lot of history lies behind the whole thing. You see, the demand for VICTOR insulators has been increasing through the years. At first, we kept abreast of demand by increasing manufacturing facilities. We were still hard pressed to supply the demand. Main bottleneck was the time required for air drying to evaporate enough moisture to permit insulators to be released from their molds for finishing, glazing and firing. Then one of our slide-rule boys came up with an idea. Why not dry the insulators in their molds by means of infra-red heat? As a result of that idea, we started experimentation and built the first continuous infra-red mold release dryer in the industry. By enabling us to dry in minutes instead of hours, it broke our production bottleneck. Improved service to our customers, too.

PUTTING THE SKIN ON THE SAUSAGE

An insulator needs a skin, too, before it's ready to take up its duties on your line. That skin is glaze. Glaze is a glass-like coating that not only improves appearance but resists accumulation of contaminants. VICTOR's scientifically fitted glaze in combination with *Purified* Porcelain gives extra high mechanical strength. VICTOR Suspensions are glazed in special automatic glazing machines, designed and built by VICTOR. In them, unglazed insulators on spindles automatically rotate through continuously circulating glaze, assuring glaze application of controlled, uniform thickness.

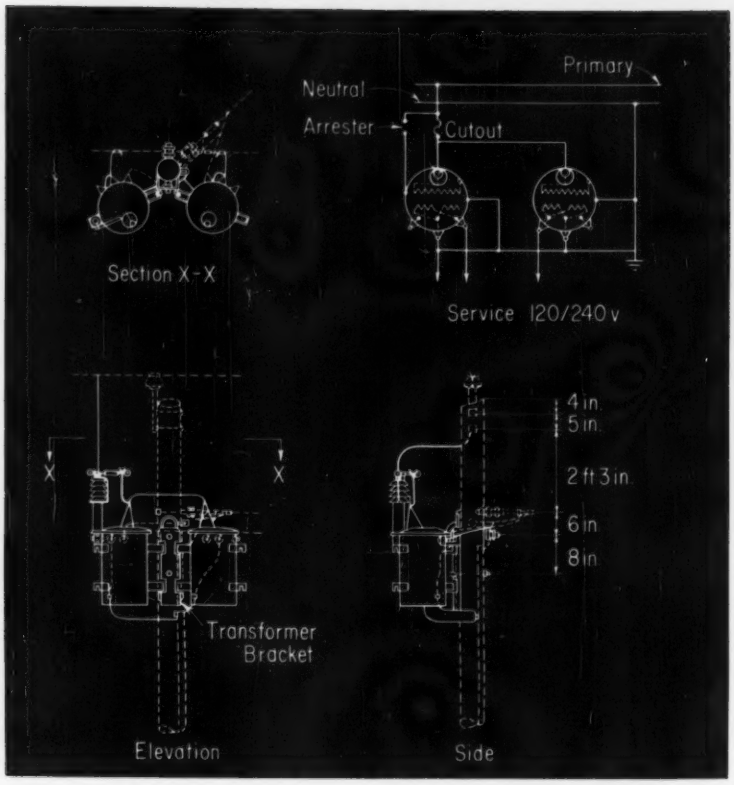
DON'T LIKE BROWN? THEN TAKE GRAY

VICTOR 25,000 lb. suspension insulators, either ball or socket or clevis type, can now be had in gray glaze at no extra charge. When ordering, be sure to indicate catalog number and color of glaze desired.

For full information and engineering data on VICTOR Suspensions, write I-T-E Circuit Breaker Company, Victor Insulators Division, Victor, N.Y.

I-T-E CIRCUIT BREAKER COMPANY
VICTOR INSULATORS DIVISION

Connect Transformers in Parallel Properly



TRANSFORMERS IN PARALLEL must have identical voltage and kva ratings, polarity and tap settings. If the service takeoff is run from side of pole opposite neutral, it should be deadened on the pole below the transformer

Connecting of distribution transformers in parallel, if done properly, may be a sound use of surplus stocks of small sizes of transformers. In some cases, paralleling may be preferable to the conversion or up-rating of transformers. Information* on the paralleling of transformers has been made available by the Rural Electrification Administration, U. S. Dept of Agriculture.

The REA has not encouraged this practice because of several inherent disadvantages. For example, the no-load and full-load losses of two 3-kva transformers in parallel are about the same as for a single 10-kva transformer. They are somewhat higher than the losses for the single 5-kva or 7½-kva unit for which they will substitute.

Excessive circulating current and losses may result if the parallel transformers have different percent impedances or are set on different tap positions. It is also more difficult to arrange two transformers and their associated jumpers into a safe configuration on the pole.

Although these disadvantages exist, it may be desirable to parallel transformers to use the available stock of small sizes. One common method of paralleling is to connect both primary windings in parallel and both secondary windings in parallel. This requires that the transformers not only have identical voltage ratings but also that their percent impedances be very nearly identical. This method will permit the paralleling of two transformers of different ratings.

Another method of paralleling which seems more applicable is illustrated. The primary windings are in parallel but the secondaries (each connected for 120 v) are in series. This connection requires two transformers of the same kva rating but not the same impedance.

The connection shown is for two transformers having like polarity. If they have unlike polarity there will be zero voltage between the "hot" secondary wires. This can be corrected by reversing the internal secondary connections of one of the transformers. This will seldom be a problem because all modern 7,200-v and 7,620-v pole-type transformers have additive polarity and all 14.4-kv transformers have subtractive polarity. Some older or rebuilt transformers may vary from this rule, however.

The mounting bracket shown is designed to support two transformers about 120 deg apart on the pole. These brackets are less expensive than cluster mounts which are intended for multiphase installations.

Generally it is impractical to add a transformer in parallel without disturbing an existing installation. If the second transformer is located 90 to 120 deg from the first, it often will be right at the point of the service deadend. If the service is dropped below the transformer, a great deal of ground clearance will be lost. If the second transformer is located 180 deg from the first, the jumper arrangement is combersome and hazardous. Use of a second high-voltage jumper and hot-line clamp is an extremely dangerous practice and should be avoided.

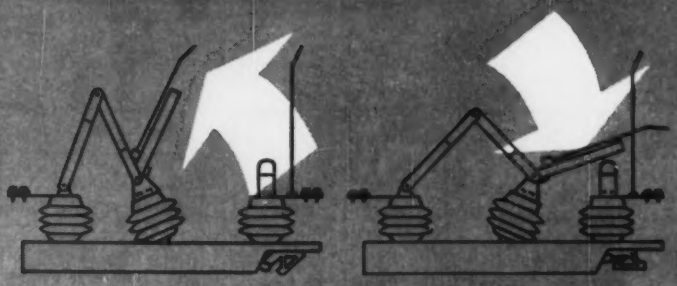
Remove Original Transformer

Installation of a parallel transformer bank involves at least the temporary removal from the pole of the existing transformer, which likely will have been in service for a number of years. Thus, two reconditioned transformers should be installed and the original transformer returned to the shop for inspection and maintenance before it is re-installed on the system.

* REA Bulletin 61-9, "Parallel Connection of Distribution Transformers."

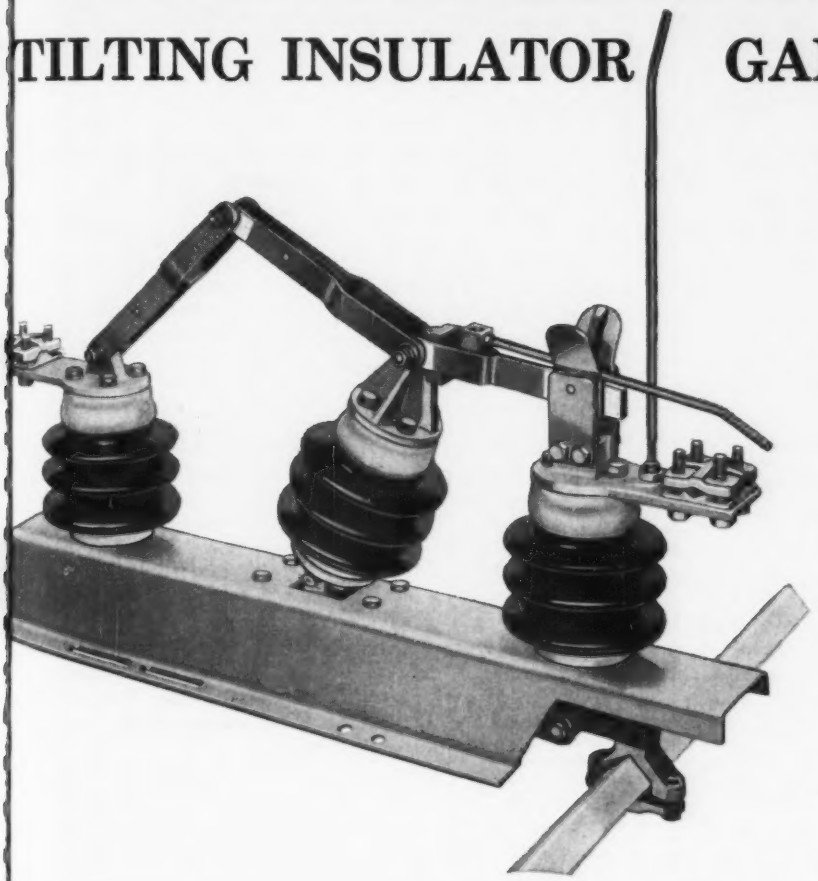
Special **KEARNEY** design for

smooth opening and closing



despite crossarm warpage

TILTING INSULATOR GANG SWITCH



- Switch works smoothly even when crossarms are warped out of alignment, horizontally or vertically, because the specially designed interphase shaft clamp compensates for any structural distortion
- Double leverage frees switch blade of heavy ice coatings: "pry-out" blade action plus toggle action of operating linkage on the tilting insulator
- Longer maintenance-free service in corrosive atmospheres—and in unusually frequent operation—because there is no flexible blade shunt to wear out
- Extra long jaws: adjustment for blade travel need not be critical . . . silver blade to jaw contacts
- Tilting insulator supported by Oilite bearings
- Easy installation . . . interphase shaft can be lifted into clamps after switch is in position

JAMES R. KEARNEY CORPORATION

General Offices: 4224-42 Clayton Ave., St. Louis 10, Mo.

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SAFER MAINTENANCE
Specify

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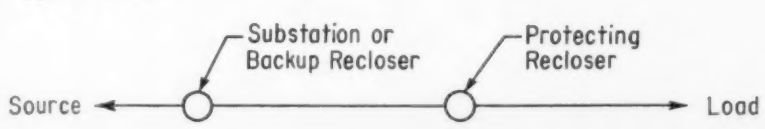
Engineering Reference Sheet

Protecting Recloser

Substation or Backup Recloser	160 Amp. M.B. or M.B.H.	100 Amp. M.B. or M.B.H.	60 Amp. M.B.	185 Amp. Kyle "W" 3 Phase	140 Amp. Kyle "W" 3 Phase	100 Amp. Kyle "W" 3 Phase	100 Amp. Kyle "L"	50 Amp. FR-1	50 Amp. AR-1	50 Amp. FP-119	50 Amp. GR	50 Amp. Kyle "L"	25 Amp. FR-1	25 Amp. AR-1	25 Amp. F.P.-119	Minimum Trip Amperes	*Maximum Fuse Size for Coordination Beyond Recloser		Interrupting Rating of Reclosers in Amperes							
																			2.4-14.4 Kv.	2.4-4.16 Kv.	12-14.4 Kv.	4.8 Kv.	14.4 Kv.			
280 Amp. M.B.H.	X[1]	X	X				X	X	X	X	X	X	X	X	X	490	100T			2,000						
250 Amp. M.B. or M.B.H.	X[2]	X[3]	X				X	X	X	X	X	X	X	X	X	450	80T		6,000	2,000						
200 Amp. M.B. or M.B.H.	X[4]	X[5]	X				X[7]	X	X	X	X	X	X	X	X	350	80T		6,000	2,000						
160 Amp. M.B. or M.B.H.		X[6]	X				X[8]	X	X	X	X[9]	X	X	X	X	280	65T		5,000	2,000						
100 Amp. M.B. or M.B.H.			X[10]					X[11]	X	X		X	X	X	X	175	40T		3,000	2,000						
60 Amp. M.B.										X				X[12]	X	100	25T		2,000							
280 Amp. Kyle "W" 3 Phase	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	560	80T "B" Curve 140T "C" Curve				12,000	8,000				
400(x) Amp. Kyle "W" 3 Phase	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	560	80T "B" Curve 140T "C" Curve				12,000	8,000				
185 Amp. Kyle "W" 3 Phase		X	X		X[13]	X		X	X	X	X[22]	X	X	X	X	370	65T "B" Curve 100T "C" Curve				11,100	8,000				
140 Amp. Kyle "W" 3 Phase		X	X			X[14]		X	X[15]	X	X[23]	X	X	X	X	280	50T "B" Curve 80T "C" Curve				8,400	8,000				
100 Amp. Kyle "W" 3 Phase			X					X	X[16]	X		X	X	X	X	200	40T "B" Curve 50T "C" Curve				6,000	6,000				
100 Amp. Kyle "L"			X[17]					X[18]	X[19]	X		X	X	X	X	200	30T "B" Curve 50T "C" Curve				6,000	4,000				
50 Amp. FR-1										X			X	X	X	100	25T	1,500								
50 Amp. AR-1										X			X	X	X	100	25T	1,200								
50 Amp. FP-119															X	140	-	1,200								
50 Amp. GR										X			X	X	X	100	30T				2,500	2,000				
50 Amp. Kyle "L"										X			X[20]	X[21]	X	100	15T "B" Curve 25T "C" Curve				3,000	3,000				
25 Amp. FR-1															X	50	12T	600								
25 Amp. AR-1															X	50	12T	600								
25 Amp. FP-119																70	-	600								

[X] = Reclosers Coordinate. [X^No.] = Reclosers coordinate with exceptions as noted at bottom of opposite page.

*Fuses are EEI-NEMA Type T Links.



Coordinate Reclosers Easily

JOHN M. BIFULCO, Distribution Engineering Section, Pennsylvania Electric Co, Erie, Pa.

By knowing the size of a back up recloser, a protecting recloser can be coordinated with it by reference to the table. Begin at the left hand column of the table opposite the back up recloser available. Proceed to the right horizontally to discover the sizes of protecting reclosers that can be coordinated.

By progressing further to the right, the minimum trip current of the back up recloser is shown. The maximum fuse size that will coordinate with this recloser and its interrupting capacity are also shown. Minimum fuse sizes are not listed as most single-phase lines would be fused with 15 or 20 amp or larger links. A similar chart can be made for reclosers other than those listed.

FOOTNOTES TO CHART

[1] Coordination exists to 1500 amperes if 280-amp MB or MBH recloser on Lever 1. Above 1500 amperes to 2500, 280-amp recloser to be placed on Lever 3. 160-amp MB or MBH left on Lever 1.

[2] Coordination exists to 1300 amperes if 250-amp MB or MBH recloser on Lever 1. Above 1300 amperes to 2000, 250-amp recloser to be placed on Lever 3. 160-amp MB or MBH left on Lever 1.

[3] Coordination exists to 1400 amperes. Above 1400 amperes to 2000, 250-amp. MB or MBH to be placed on Lever 3.

[4] Coordination exists to 1300 amperes if 250-amp MB or MBH recloser on Lever 1. Above 1300 amperes to 1600, 200-amp recloser to be placed on Lever 3. 160-amp MB or MBH left on Lever 1.

[5] Coordination exists to 1000 amperes if 200-amp MB or MBH recloser on Lever 1. Above 1000 amperes to 1600, 200-amp recloser to be placed on Lever 3. 100-amp MB or MBH left on Lever 1.

[6] Coordination exists to 800 amperes if 160-amp MB or MBH recloser on Lever 1. Above 1300 amperes, 160-amp recloser to be placed on Lever 3. 100 amp MB or MBH left on Lever 1.

[7] From 1000 to 2000 amperes—No coordination in this range of current. For other values of current coordination exists.

[8] Coordination exists if Kyle "L" is put on "B" curve. 160-amp MB or MBH is on Lever 1.

[9] Coordination exists to 700 amperes. Above 700 amperes, 160 amp MB or MBH to be placed on Lever 3.

[10] Coordination exists to 500 amperes. Above 500 amperes to 800, 100-amp MB or MBH to be placed on Lever 3. Above 800 amperes, same time to lockout.

[11] Coordination exists if 100-amp MB or MBH is placed on Lever 3.

[12] Coordination exists to 300 amperes. Above 300 amperes, 60-amp MB to be placed on Lever 3.

[13] For currents less than 1200 amperes, coordination exists for "B" curves of both reclosers. If 185-amp Kyle "W" is put on "C" curve and 140-amp Kyle "W" left on "B" curve, coordination exists for all values of current.

[14] For currents less than 1000 amperes, coordination exists for "B" curves of both reclosers. If 185-amp Kyle "W" is put on "C" curve and 100-amp Kyle "W" left on "B" curve, coordination exists for all values of current.

[15] Coordination exists to 800 amperes. Above 800 amperes 140-amp Kyle "W" to be placed on "C" curve.

[16] Coordination exists if 100-amp Kyle "W" is placed on "C" curve.

[17] Coordination exists if 100-amp Kyle "L" is placed on "C" curve.

[18] Same as No. 17.

[19] Same as No. 17.

[20] Coordination exists if 50-amp Kyle "L" is placed on "C" curve.

[21] Same as No. 20.

[22] Coordination exists if 185-amp Kyle "W" is placed on "C" curve.

[23] Coordination exists if 140-amp Kyle "W" is placed on "C" curve.

Procurement & Products

BUYING **Buyers are displaying a cautious attitude,** reports the National Association of Purchasing Agents in its latest monthly business survey. Few buyers are willing to extend commitments too far for fear of over-inventorying in the event of a letdown in production due to a shortage of steel. But they do not want to be caught short if the promised boom of 1960 materializes earlier than expected.

COPPER ▶ **Prices climb on copper conductor.** Phelps Dodge has announced an increase of 1½¢ per lb on wire and cable products, reflecting an increase in the base cost of copper. Anaconda Wire and Cable followed, and other fabricators are expected to do the same.

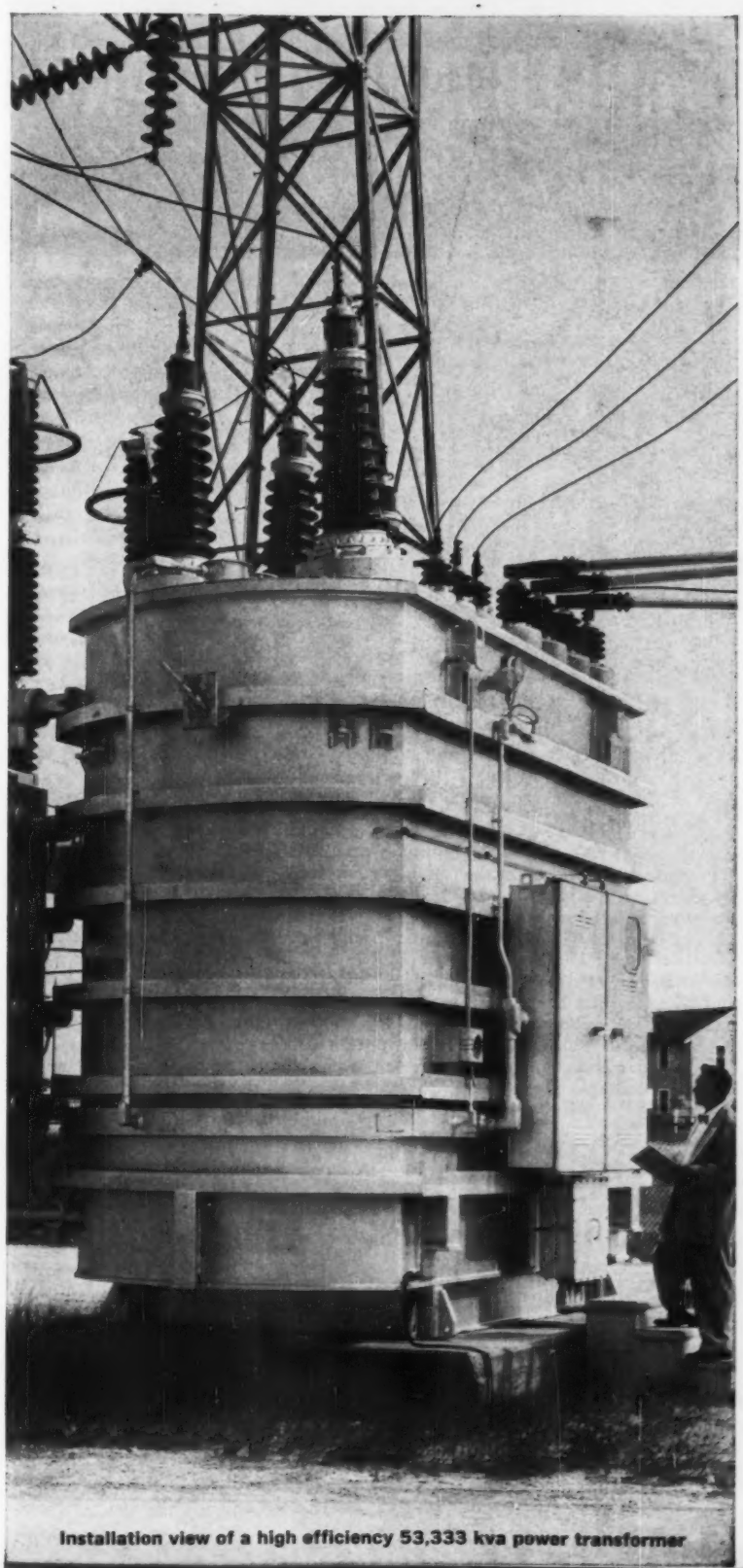
STEEL ▶ **Purchasing agents generally foresee 1-4% rise in steel prices** during the next year if the industry even partially gives in to union demands. Added to the possibility of higher production costs is the growing demand for steel to rebuild inventories. The two factors spell an increase in prices, said some 75% of the PA's recently interviewed by Purchasing Week newspaper.

But the steel strike has not delayed steam turbine shipments to date, say major manufacturers. One large manufacturer does note a growing shortage of standard parts, and forecasts trouble ahead unless the steel workers get back into full production soon.

OUTLOOK ▶ **Nor will the steel strike reduce capital expenditures** for next year, predicts the McGraw-Hill Department of Economics. The strike has unquestionably delayed the start of some projects and confused the preliminary planning of others. But practically all of this can be made up as the year gets underway. Structural steel is expected to be readily available soon after the mills get working. It is an item for which the mills have relatively small backlogs and substantial excess capacity. To the extent that delays occur because companies have held back commitments for so long, their expansion programs may stretch into 1961. Highlights of the Economics Department's Fall Survey on capital spending plans will be carried in this space next week.

COMPUTERS ▶ **New computers will be available for hourly rental** by businesses in Philadelphia, New York, Chicago, and Los Angeles by the middle of next year. These "Datacenters," operated by International Business Machines Corp, are said to represent a radical departure from IBM's traditional leasing policy covering the data processing equipment. Users are to supply their own programmers and their own operators. The rate for use of the 7070 unit will be $300 an hour.

News of Manufacturers ..... page 105
New Equipment ..... page 110
Readers Service ..... page 120



Installation view of a high efficiency 53,333 kva power transformer

UNIVOLT® 35 TRANSFORMER OIL

High Oxidation Stability... Low Power Factor

Univolt 35 is an outstanding transformer oil because of its excellent oxidation stability, low power factor and lasting insulation action. This dependable, proved-in-use product is refined from a high quality, specially selected straight mineral oil. Its highly desirable characteristics include low viscosity, freedom from acid, alkali and corrosive sulfur, and compatibility with the varnish finishes of coils.

Univolt 35 offers outstanding performance under the conditions of extreme heat produced by peak summer loads serving commercial and home air conditioning. The utmost care is taken in transporting Univolt 35: it is shipped in specially prepared and inspected tank cars which are loaded indoors.

Univolt N36 is another high quality transformer oil. Perfected by Esso Research, it possesses all the characteristics of Univolt 35 plus an effective oxidation inhibitor. For complete information, contact your nearest Esso Office or write: Esso Standard Oil Company, 15 West 51st Street, New York 19, New York.

Esso

In Industry after Industry..."ESSO RESEARCH works wonders with oil"

EXACTLY THE PANELBOARD YOU WANT

Right Off Your Square D Distributor's Shelf!

In our contracting business, we find QMB PANELBOARDS are just the thing for heavy industrial jobs. The switches are heavy-duty horsepower rated and they plug in just like plug-in duct units or drawout air circuit breakers. The switch unit I'm holding is a twin 60 ampere 3-pole unit, rated 600 volts. We picked up the entire panelboard this morning from our local Square D distributor's stock to use on a 480 volt job. *We'll have it installed and wired by tomorrow afternoon—and no overtime.*

Notice that this 240 volt switch is much smaller than the 600 volt unit. That means we can put more circuits in the same size panelboard. Since Square D started making these new smaller units, we've been using QMB on all our commercial jobs. The interiors and boxes are the same for both 240 and 600 volt panelboards. That means one stock can work for both. *We can get the complete panelboard from our local Square D distributor the same day the job develops.*

We don't gang separate safety switches and motor starters over a trough any more. The new QMB MOTOR STARTER PANELBOARD makes a much cleaner job. It's easier to install, it costs no more, and it's in our distributor's stock. In our business, we're concerned with overall installed costs. We find the installed cost of the QMB STARTER PANELBOARD is no greater than that of separate components. The interlock between the switch and starter doors makes a much safer installation, too.

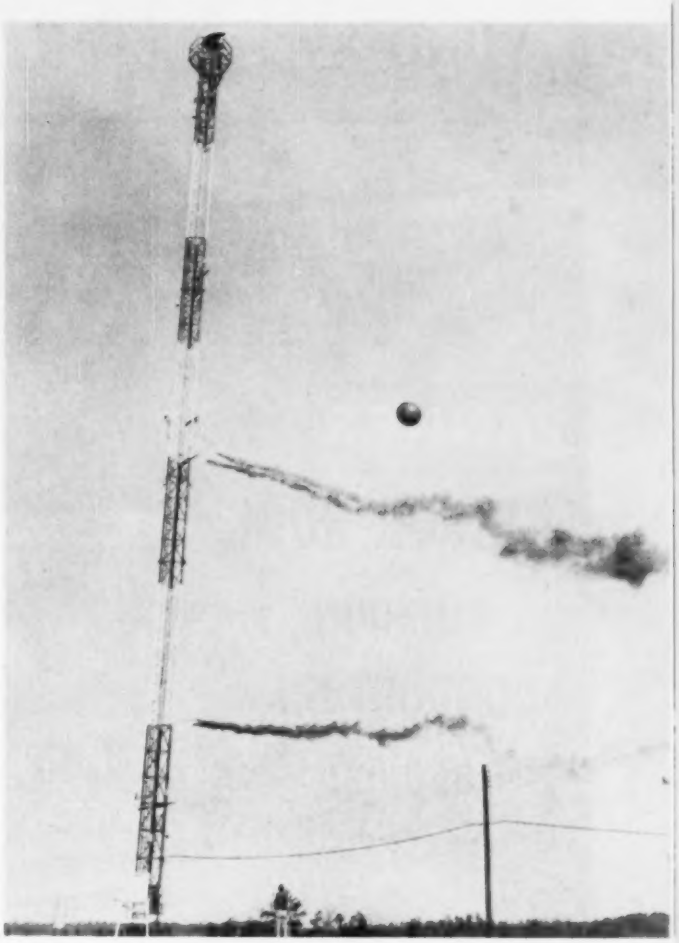
• Plug-in construction combined with heavy-duty industrial design has made the QMB PANELBOARD a tremendous success. In fact, the flexibility of this unit plus availability from distributor stocks, has made it the leading power panelboard on the market. It's available either in 600 volt or 240 volt construction. Motor control units are available for use with either voltage switch units. When switch units exceed 200 amperes, the panelboards can be obtained from the nearest Square D Assembly Plant, completely factory-assembled. It's the modern fusible standard.

For additional information
write Square D Company, 6060 Rivard Street, Detroit 11, Michigan

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

Lockheed Studies Atmospheric Problems



Lockheed-Georgia meteorologists are conducting tests on atmospheric variables (right) which are expected to offer industries savings of many millions of dollars annually. At the Lockheed's Georgia Nuclear Laboratory, Dawnsonville, Ga., this study of the intensity and direction of low-level temperature inversions is emphasized by smoke from smudge pots.

A team of "G-men of the atmosphere" is made up of the USAF's Georgia Nuclear Laboratory personnel, the Georgia Institute of Technology, and the Carolina-Virginia Nuclear Power Associates in Charlotte, N. C. The laboratory was built and is operated by Lockheed.

Where and when will power lines collapse in a freezing ice storm? If an industry considers a new location, which way and how frequently will objectionable fumes blow? Where should an atomic power plant be located? When a public utility depends on a combination of water power and coal, what will be the precipitation in the utility's watershed? These are some of the more than 20 analyses which Lockheed and a team of atmospheric experts are making. Other studies include low-level wind circulation studies, analysis of air routes and missions.

Current proposals include a study of the rise and fall of rivers supplying water for hydro-electric public utilities, a long-range, low-temperature forecast for a natural gas company to insure an adequate heating supply by making long-range predictions to accurately gear sales to sudden weather changes not in line with the season.

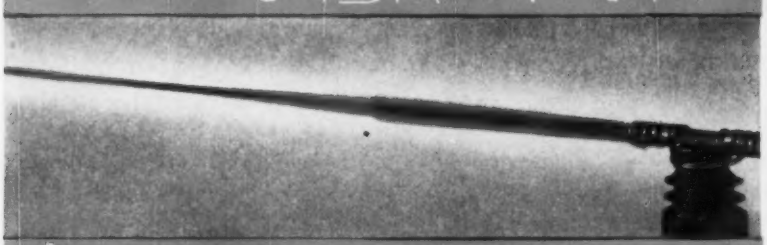
Jet 'Copter Service Begins

Jet helicopter service is now available in San Diego County through the acquisition of two Alouette helicopters by Coast Rotors, a newly-formed company that will offer multi-mission 'copter services to the Southern California area.

Shown at left are the two Alouettes, made by Republic Aviation, being accepted by officers of Coast Rotors. Among the services to be offered by this company will be power and communication line installation, inspection, and maintenance; "flying crane" heavy equipment hauling and installation; surveying; aerial photography; and other services suited to helicopters.

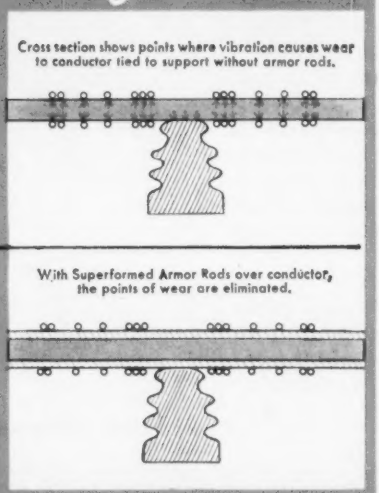
The Alouette is said to be capable of carrying a payload virtually equivalent to its own weight, or almost 2,000 pounds. Cruising speed of the helicopter is 105 mph at 10,000 feet. The single-shaft, horizontally-mounted, gas turbine engine develops 400 hp.

TAKING THE PUNISHMENT OF WIND VIBRATION



FANNER Superformed* ARMOR RODS

CUSHION CONDUCTORS against DAMAGE!


Cross section shows points where vibration causes wear to conductor tied to support without armor rods.
With Superformed Armor Rods over conductor, the points of wear are eliminated.

Even at low wind velocities, overhead lines are often subjected to thousands of stress reversals per minute due to aeolian vibration.

With Fanner Superformed Armor Rods installed at points subject to stress and abrasive wear, the conductor receives the best protection against vibration damage as well as electrical burning . . . and many expensive line repairs are eliminated.

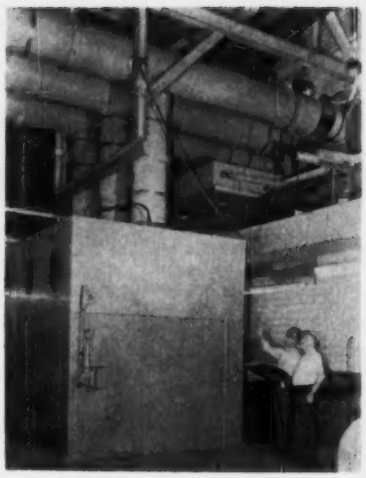
Fine FANNER Superformed Products

ARMOR RODS · FANNSPLICES · FANNGRIPS
LINEGUARDS · PATCH RODS · TAP ARMOR
PLASTIC FANNGUARDS · NOVERGARD MOLDINGS

THE FANNER MANUFACTURING CO.
BROOKSIDE PARK CLEVELAND 9, OHIO
Electrical Products Division

*Trademark

Licensed for use under or made in accordance with one or more of the following patents: Patent No. 2,567,521, 2,700,670, 2,900,443 . . . Other patents pending.



Isolated Phase Bus Goes In at Eddystone

Isolated phase bus installation for the first of two generating units at Philadelphia Electric's 650-Mw Eddystone plant receives final checkout before preliminary start-up. The bus installation, supplied by I-T-E Circuit Breaker and consisting of 1400 single-phase-feet of 5500-, 7500-, and 10,000-ampere sections, will carry power from the generators to the step-up transformers.

MANUFACTURERS BRIEFS

Westinghouse Electric plans to set up a centralized research and development center in Pittsburgh, which will bring together all key personnel associated with the company's basic and applied research program. Full occupancy of facilities is scheduled for '61 . . . TVA awarded contract to **American Elin Corp** of Austria for three 32.4-Mw hydro-electric generating units for Wheeler Dam. AE submitted a firm bid, evaluated at $2,399,308, which included a 12% penalty since **General Electric,** lowest domestic bidder, is in a labor surplus area. GE's evaluated bid was $2,571,619. AE agreed to pay liquidated damages for late deliveries, but GE omitted this clause, as did other domestic bidders. Seventeen invitations were sent, with seven responses . . . **Burndy Corp's** European subsidiary,

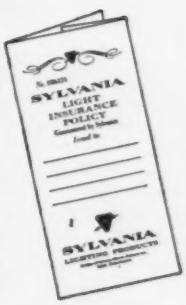
(*Continued on page* 108)

Only Sylvania guarantees premium performance in its standard fluorescent lamps at standard prices—*with an exclusive Light Insurance Policy!*

Sylvania Fluorescent lamps are made to *one* standard of quality only—the highest. And you get it at standard prices.

Conduct your own light meter test. Take for instance, Sylvania's 40-watt Cool White Rapid Start Lamps and any similar competitive lamp claiming extra lumens. Operate them for a few weeks. Keep a record of their performance.

You'll prove to yourself Sylvania standard fluorescents deliver more light, cost less. And if you care to measure lumens output during lamp life, you'll find Sylvania lamps burn brighter and longer.



That's why Sylvania backs up its statements with an exclusive money-back guarantee! Sylvania Fluorescents must give you more light at lower cost than any other brand—or cost you nothing!

Interested in learning more? Ask your Sylvania representative or supplier to see a copy of this revolutionary Sylvania Light Insurance Policy. Or write:

SYLVANIA LIGHTING PRODUCTS
Dept. 9L-7611, 60 Boston Street
Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
P. O. Box 1190, Station "O", Montreal 9

SYLVANIA
Subsidiary of
GENERAL TELEPHONE & ELECTRONICS

CUT INSTALLATION and SERVICE COSTS on rural entrances...

Hi-LINER

pole-top metering
and circuit breaker cabinets

- *one complete package— 200 amp. service and more!*
- *no meter-loop needed!*
- *heavy duty industrial-type circuit breakers— ground level disconnect!*

Cut installation and service costs on entrances of 200 amps. or more—eliminate costly, power consuming meter-loops with HI-LINER! Head and shoulders above the usual pole-top metering installation, the Hi-Liner combines an overhead mounted current transformer with ground controlled line switches in rain-tight steel cabinet. Installation is fast . . . all you need is one 4-conductor #12 cable and ½" conduit running down the pole to the meter. No more heavy wire loop, weatherhead, large diameter conduit —and you'll eliminate the entire voltage drop of the meter loop! Now your customer can disconnect his entire system for emergencies or repairs—and you'll eliminate countless service calls on disconnects and local failures.

NEW! Two-way split entrance breaker—provides all the advantages of the Hi-Liner plus a split of the 200 amp service into two 100 amp. lines. Breakers may be ground controlled either individually or simultaneously.

NEW! Underground secondary—contains a 200 amp. meter socket, 200 amp. circuit breakers with overcurrent protection, secondary wiring trough and terminal strip in one compact, pre-wired package!

WRITE TODAY—for detailed specifications on single phase, three phase, split-breaker, and other Hi-Liner units.

NOTE: Choice distributor territories available, write to:

HI-PRODUCTS, INC.
7722 WENTWORTH SO. MPLS. MINN.
A subsidiary of GENERAL ELECTRONIC CONTROL, INC.

Burndy Electra S.A., will make electrical connectors for users in the Common Market nations in a new plant at Malines, Belgium . . . **Allis-Chalmers** has acquired Valley Iron Works, Wisconsin paper-making equipment maker . . . **Schwager-Wood** has become autonomous division of NWL Corp, holding company. S-W, maker of high-voltage electrical equipment, continues with same policies and management . . . **ALCO Products** has agreed to collaborate with AEI, of London, in design, manufacture, and sale of diesel-electric locomotives, 900 hp and higher, to world markets. Associated Electric Industries is largest manufacturer of electrical equipment in the British Empire . . . **American Meter Co** has acquired all outstanding capital stock of the Granberg Corp of Oakland, Calif, maker of tank truck, bulk plant and pipeline petroleum meters and pumps . . . **Babcock & Wilcox** has received a contract for over $8 million to make Universal Pressure "once-through" steam generator for Public Service E&G Co's Sewaren generating station. "Once-through" principal: water enters at one end, picks up heat, changes to steam, becomes superheated and leaves the other end at the desired pressure and temperature . . . New Marlex linear polyethylene rope used for hauling power conductors onto high-voltage transmission line supports is manufactured and distributed by leading U. S. rope companies. It is a strong, lightweight rope with high electrical resistance . . . **General Electric** demonstrated the magnetohydrodynamic generation of power for possible use in outer space. Five kw of power are generated in the GE device by sending a hot ionized gas jet through a magnetic field and collecting the resultant electron flow via a quartz sleeve surrounding the jet.

MANUFACTURERS LITERATURE

SAFETY STARTERS . . . Type L, combination. Used to control industrial equipment such as heavy machine tools. Booklet B-7322, 10 pages. Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa. **(J 1)**

POWER TRANSFORMERS . . . for large substation, transmission tie, and generator step-up applications. GE's new Preferred Design, 12 to 250 Mva and up to 230 kv. Pricing information, outline drawings, ratings, dimensions, cooling arrangements, and application information for representative ratings. Bulletin GEA-6604A, 42 pages. General Electric Co, Schenectady 5, N. Y. **(J 2)**

METAL-CLAD SWITCHGEAR . . . drawout, Type DST 5-350 and DST 15-1000 air circuit breakers for use in metal-clad switchgear. Breakers are rated 5 kv, 350 Mva and 15 kv, 1000 Mva, respectively, both 1200 and 3000-amp continuous current ratings. Photos of both breaker and cells, components. Mounting information. Bulletin 3-450, 8 pages. Federal Pacific Electric Co, 50 Paris St, Newark 1, N. J. **(J 3)**

TRANSMITTER AND RECEIVER UNITS . . . carrier-current, Type 50, transistorized. For transfer-trip relaying, telemetering, supervisory control, automatic dispatching, load-frequency control, teletype and other functions requiring highspeed impulse transmission. GEC-1537, 8 pages. General Electric's Communication Products Dept, Lynchburg, Va. **(J 4)**

INSULATORS . . . high-voltage; standard line of insulators and hardware for distribution, transmission, and station applications. Many new insulators and methods of construction, including distribution posts, clamp-top line posts, horizontal mounting line posts, high-voltage station posts to 1470 BIL, POC-ASA standard bushings 15 kv to 196 kv. Enlarged engineering section on standards and data. Catalog #8, 168 pages. Lapp Insulator Co, Inc, Le Roy, N. Y. **(J 5)**

ALUMINUM CONDUCTORS . . . "Overload and Fault Current Limitations of Bare Aluminum Conductors," second portion of long-range engineering date project. Graphs showing maximum allowable time for various high value emergency or short circuit currents, in utility transmission or distribution lines. Included are graphs for both stranded aluminum conductor and ACSR. Booklet, 16 pages. Aluminum Co of America, 792 Alcoa Bldg, Pittsburgh 19, Pa, or obtain from any Alcoa sales office. **(J 6)**

Pay Scale Increases

A survey covering about one-fifth of New York's City College electrical engineering graduates shows that they averaged a $520 a month starting salary. Highest one reported was $720 month.

Average for all of the school's engineers was $495, an increase of 22% over the 1958 average.

Last June's graduates from Cornell University are getting higher salaries also, but the alignment is not quite the same. A study showed engineers averaged $530 a month to start. Graduates in engineering physics lead with a $570 average. Electrical engineers got a $538 average, which was below that of chemical and metallurgical engineers.

A-Plant Proposal

City and military officials in Colorado Springs, Colo., are discussing a proposal to ask the federal government to build an atomic power plant in the area. Ray Nixon, director of the city's municipal system, said preliminary discussions included a reactor that would cost as much as $10 million.

The city might purchase the plant's steam for use in the existing steam station's turbine, Nixon said. Cost would be an estimated 34¢ per Btu compared with the present 23¢ for natural gas.

The recently passed public works bill included $10 million for start of construction on headquarters for the North American Air Defense Command near the city. The Air Force is considering construction of an A-plant in the underground center as a source of standby power.

First BWR Reactor On Stream in Norway

The world's first boiling-water reactor went into service last month in Halden, Norway, about 100 miles east of Oslo. The 20-Mw reactor, sunk in a 9-ft thick concrete tank within a mountain, is described as 100% safe because of self-stabilization.

The reactor is to be used mainly for research during the next three years. Tests in 1960 will determine if its steam can produce power for local use after the research phase has been completed.

Crapo GALVANIZED **STEEL STRAND**

Checked and Double-Checked by Laboratory Technicians

Every coil of wire used in the manufacture of *Crapo* Galvanized Steel Strand is tested and approved by trained laboratory technicians. Samples from both ends of each individual coil are subjected to a series of prescribed tests before stranding. Then, the finished strand is re-checked to make certain that it conforms in every respect to established specifications and our own high quality standards.

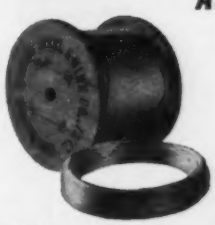
Thus you know when you specify *Crapo* Galvanized Strand that every precaution has been taken to assure maximum performance in the finished product.

Write for Free Booklet

"The Story Behind **Crapo** Galvanized Wire and Strand" illustrating and describing manufacturing techniques and testing procedures. Ask for Booklet B-59!

AVAILABLE IN 3 COATING WEIGHTS

FOR GUYS, MESSENGER AND OVERHEAD-GROUND WIRE



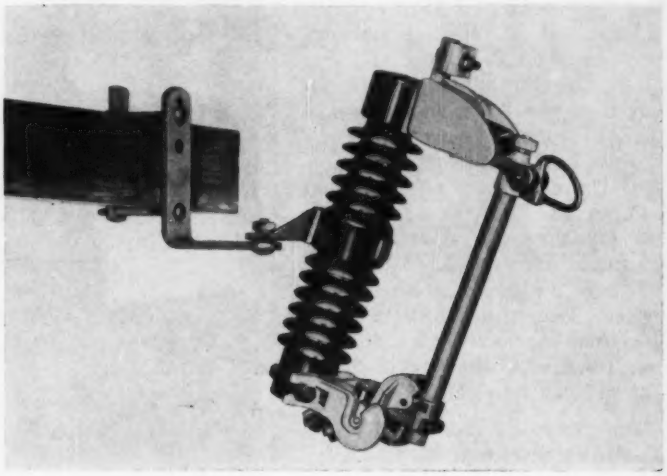
Crapo Steel Strand is available in all standard sizes and grades and in Class A, B and C galvanized coatings. Class B coating is twice as heavy as Class A coating; Class C coating is three times as heavy.

*Determines ductility of wire and adherent quality of galvanizing.

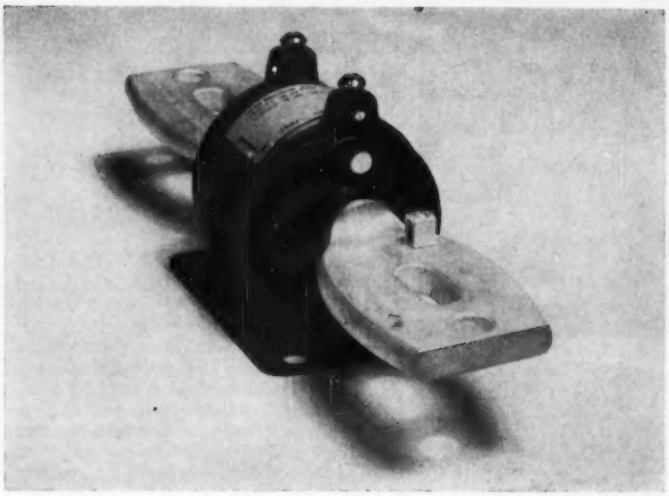
INDIANA STEEL & WIRE CO., INC.
Muncie, Indiana

(For further information refer to Readers Service on page 120)

Open Cutouts . . .



. . . have voltage ratings of 7.8, 15 and 27 kv and have interrupting ratings of 20,000, 16,000 and 6,000 amp respectively. The 100-amp Type LMO cutouts afford superior fault-current protection to distribution systems with voltages of 7,200 v delta through 14,400/24,900 v grounded wye. They have interchangeable fuseholders that accept any EEI-NEMA standard button-type fuse link.
Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.

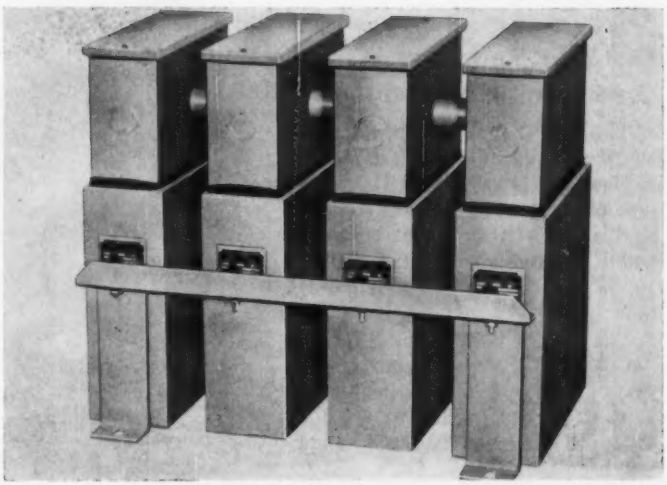


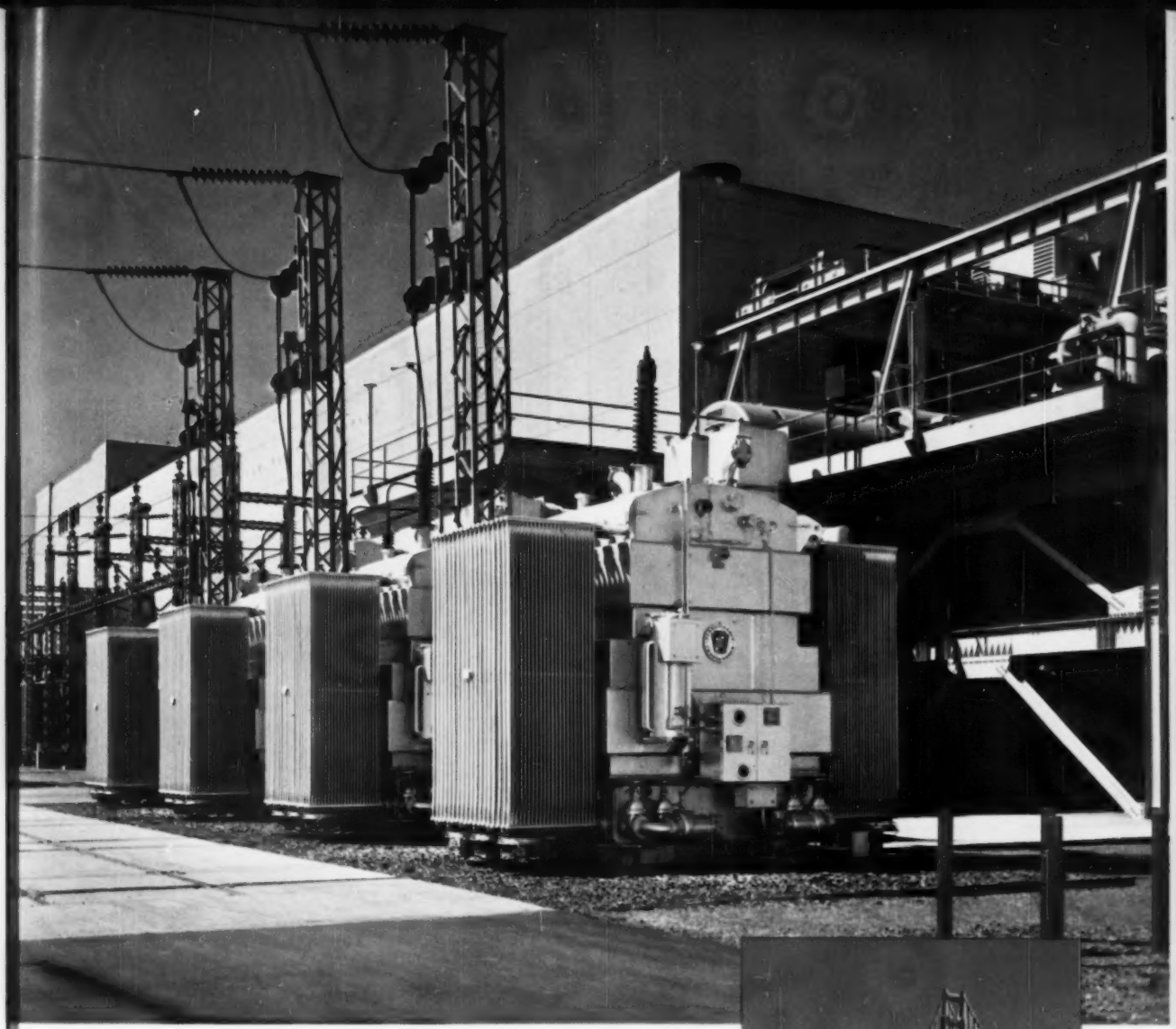
Indoor CT . . .

. . . is available in 200, 400, 600 and 800:5 amp ratings. The 600-v unit, designed specifically for indoor use, is priced less than comparable indoor-outdoor models. The butyl-molded transformer is known as Model JCX-0 and is furnished with either high base or low base bar-type construction.
General Electric Co, Schenectady 5, N. Y.

Capacitors . . .

. . . for low-voltage industrial applications are furnished for both single and 3-phase installations. Known as the Type PF standard and PFD dustproof series, they are available in 480 and 600-v units. All capacitors are impregnated with Clorinol, a non-flammable askarel synthetic liquid dielectric to permit operation over the temperature range from —40C to +46C.
Sprague Electric Co, 315 Marshall St, North Adams, Mass.





200,000-kva Bank for San Francisco Bay . . .

PG&E installs 4 single-phase
PENNSYLVANIA POWER TRANSFORMERS
for Unit No. 4 at Hunters Point

Located on the west shore of San Francisco Bay, Pacific Gas and Electric Company's Hunters Point Power Plant has undergone a tenfold expansion of capacity since the plant was built in 1929. The most recent addition—a fourth generating unit producing 165,000 kilowatts—increases the total capacity of the steam-operated plant to 427,000 kilowatts.

The four single-phase, 40,000/53,333/66,667-kva Pennsylvania Power Transformers serving Unit No. 4 feature Pennsylvania's Contour Design. This shell-form construction reduces size and weight, permits one-piece upright shipment and facilitates installation. Additional savings in size and in weight were made possible by Pennsylvania's recommendation that the transformers be designed with forced-oil-to-air cooling for *both* middle and top ratings.

Three of the transformers are "on the line" and the fourth unit is used as a spare. The transformers step up the generated voltage of 18 kv to 110 kv for transmission to a substation, four miles away, through underground, high-pressure, gas-filled, pipe-type cables.

Pennsylvania has the experience and the facilities to satisfy *any* power transformer requirements, regardless of ratings and other specifications. For information or a quotation, contact Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

McGRAW EDISON

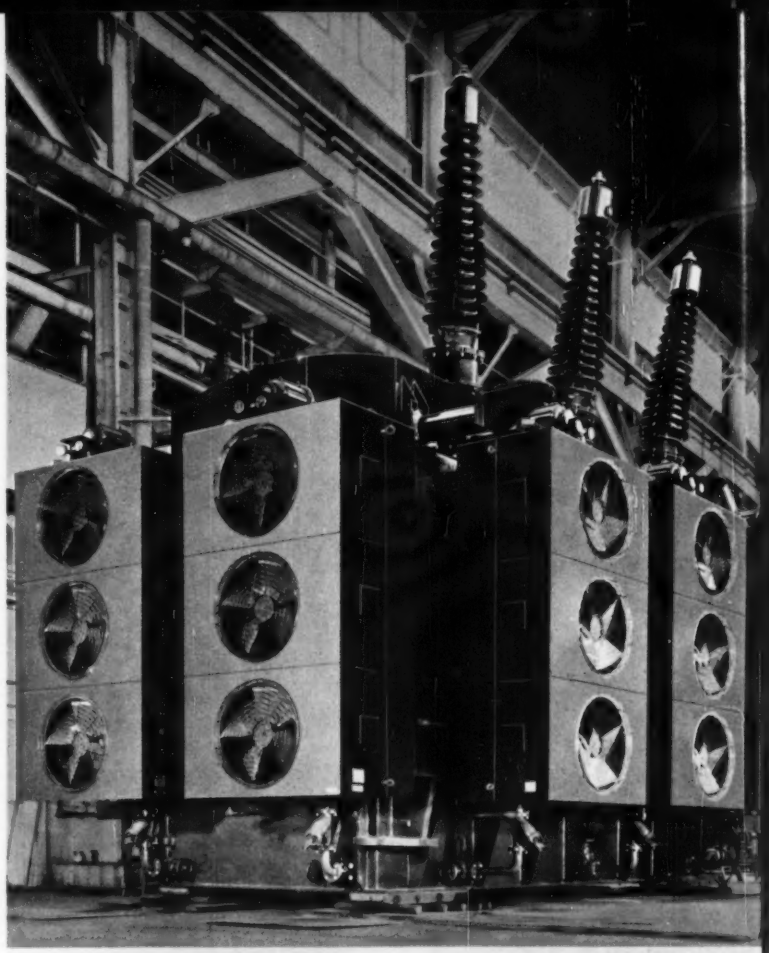
See next page for some facts on facilities . . . . . .

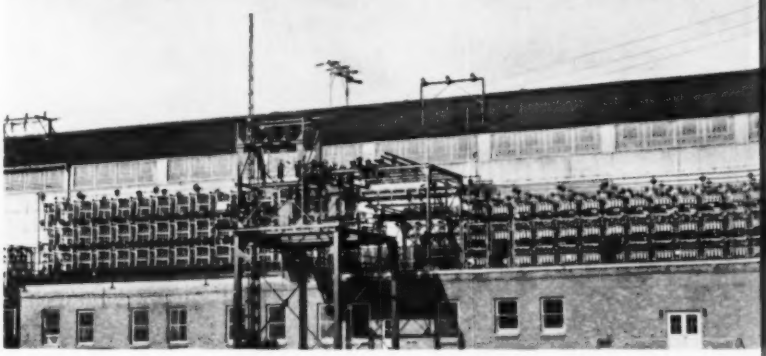
PENNSYLVANIA TRANSFORMERS

PENNSYLVANIA POWER TRANSFORMERS

Pennsylvania has the facilities and the capability to meet the largest power transformer requirements

- A large, expertly staffed engineering department with long experience in power transformer design — both core form and shell form.
- The ability to design and construct scale models for proving design characteristics.
- A modernly equipped plant capable of producing and testing the highest rated units contemplated by industry today.
- Handling and loading facilities that permit full utilization of manufacturing, shipping and installation economies.





ROOF-TOP CAPACITOR BANK SERVES POWER TRANSFORMER TESTING AREA

◀ *see other side for installation view*

The ever increasing demand by utilities for larger capacity transformers with higher voltages necessitates a greater-than-ever flexibility and capacity in transformer testing facilities. Among the steps that Pennsylvania Transformer has taken to provide necessary testing capacity, is the installation of a 50,000-kvar capacitor bank on the roof of a building adjacent to the main testing area.

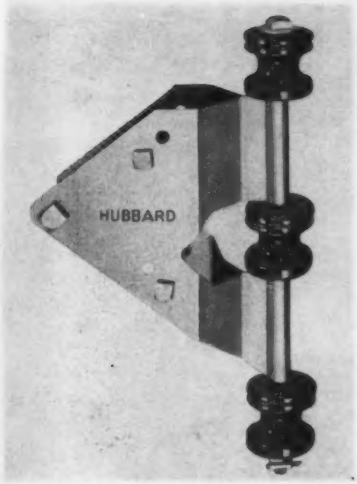
By supplying a source of reactive power that is completely unaffected by loads elsewhere in the plant and/or on the utility's system, the capacitor bank permits temperature tests to be scheduled and conducted under the most efficient possible conditions. The largest transformers being manufactured today can be tested. Among the units recently "checked out" is the 315,000-kva, 230,000-volt Pennsylvania Power Transformer shown above.

PENNSYLVANIA TRANSFORMERS

McGRAW-EDISON

PENNSYLVANIA TRANSFORMER DIVISION

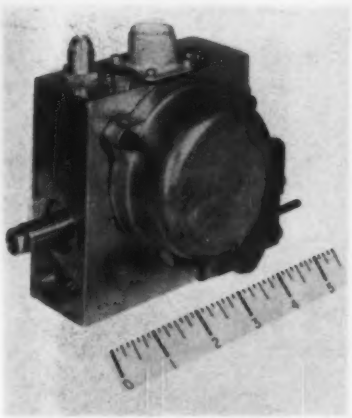
McGRAW-EDISON COMPANY • CANONSBURG, PENNSYLVANIA • GREATER PITTSBURGH DISTRICT



End-of-Arm Rack . . .

. . . is mounted on the end of the crossarm to conserve pole space. It is valuable where regulations call for increased clearance and also permits the use of a shorter pole than would normally be required for joint construction clearances where secondary services are taken from a rack on the pole. The end-of-arm rack is available for three or four conductors.

Hubbard and Co, 200 S Michigan Ave, Chicago 4, Ill.



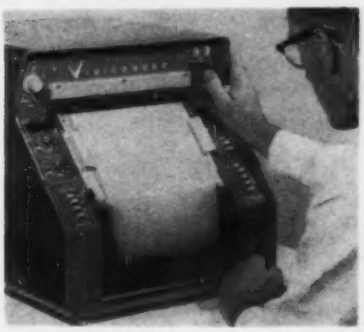
Governor . . .

. . . for use on steam turbines, gas turbines, diesel engines and gasoline engines is now available. The unit, called Model EFG, is designed for constant speed control over a 10% range in 400-cps service, and over a 30% range in 50/60-cps service. The frequency circuit operates within 3 millisec of the time that even the smallest speed change occurs.

Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

Oscillograph . . .

. . . permits high-speed recording of up to 24 channels simultaneously. Known as the 1108 Visicorder, it records information from dc to 5,000 cycles. Chart speeds, which are adjustable in 15 variations from



0.05 to 80 in. per sec, are pushbutton-selected.

Heiland Div, Minneapolis-Honeywell Regulator Co, 5200 E Evans Ave, Denver 22, Colo.

Safety Light . . .

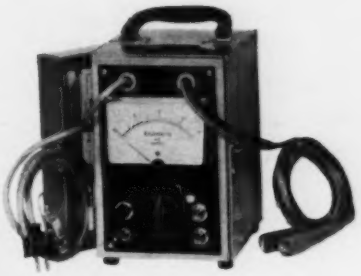
. . . features a 2-way, 7-in. lens unit, known as Model HD-2-7T. This is said to include a high-intensity bulb which can be seen over one mile in both directions and provides more than 70 flashes per min. The line is known as the "Transi-Flasher."

R. D. Fageol Co, Kent, Ohio.

Wood Bit . . .

. . . is designed to eliminate clogging, binding and stopping to clear chips, particularly in creosoted poles or heavy timber. A new adapter shank permits the 415T Irwin Pole-Bor bit to be used in both hand braces and electric drills. Overall length is about 18 in. Twelve sizes are now available.

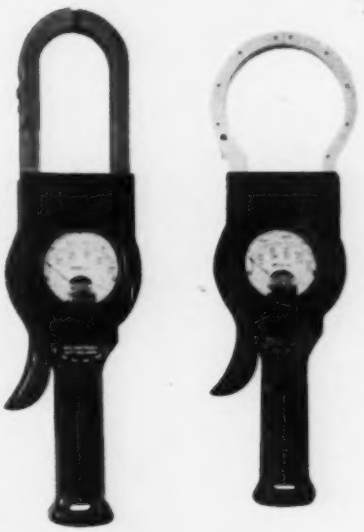
Irwin Auger Bit Co, Wilmington, Ohio.



Portable Tester . . .

. . . for insulation breakdown features an automatic "Squawker" that sounds at preset leakage current values. The operator of the Series 4003 "Squawker" HYPOT Jr. need not take his attention off the point of test to watch for visual breakdown indication while moving test prods about the terminals of multi-conductor cables.

Associated Research, Inc, 3777 W Belmont Ave, Chicago 18, Ill.



Jaw Clamp Ammeters . . .

. . . will encircle conductors up to 4½ in. in diameter. Ranges of the instruments range as high as 4,000 amp. Current values most frequently encountered are covered by

(*Continued on page* 116)

FIELD SERVICE ONLY is required for the addition of some new accessories. Here, a Sudden Pressure Relay, preassembled to a new manhole cover, is installed quickly and easily. Relay protects against extensive damage due to internal fault.

new POWER TRANSFORMER MODERNIZATION PROGRAM CUTS OUTAGES AND COSTS

Helping you cut costs and protect your power transformer investment is the sole purpose of the new Westinghouse Preventive Maintenance Through Modernization Program. It is based on the fact that the best way to reduce outage expense is to replace obsolete parts or add devices in accordance with modern practice. It is organized to provide the exact degree of modernization you need, from simple replacement of parts to complete rebuilding and uprating of transformers.

Replacement of Obsolete Parts. Use of modern components to replace outdated parts before they fail will provide a great increase in reliability of units otherwise fit for continued service.

Use of New Accessories. The latest developments, such as gas detectors, help solve old operating problems and can be purchased at little cost.

Addition of Protective Devices. Equipping your power transformers with modern protective devices assures better continuity of service. Various types relieve dangerous pressures, detect faults and indicate other abnormal conditions.

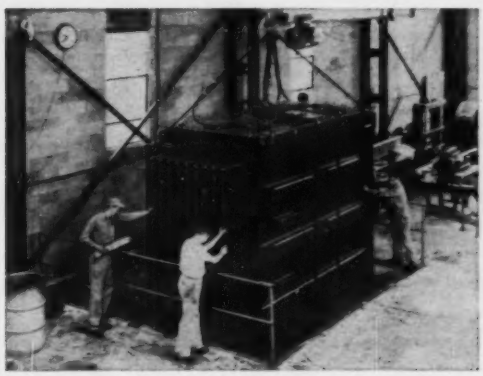
Oil Preservation Equipment. Many excellent protective systems can be installed to maintain high dielectric strength of transformer oil.

Methods to Increase Rating. Modification of present cooling system permits an increase in rating of older units. Engineering analysis is provided to determine rating increase possibilities.

Westinghouse backs this new modernization program with the full facilities and "know-how" of its 40 Manufacturing and Repair Plants throughout the country. Your nearest Repair Plant can provide efficient service in all phases of the program.

Westinghouse field service engineers will be glad to study your power transformers and recommend improvements to increase performance and reliability.

For full information, call your Westinghouse representative, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70904



Power transformer is shown being lowered into pit for detanking in a Westinghouse M & R Plant. These plants can perform modernization operations which cannot be undertaken in the field.

Here, Westinghouse service engineers detank a power transformer in the field.

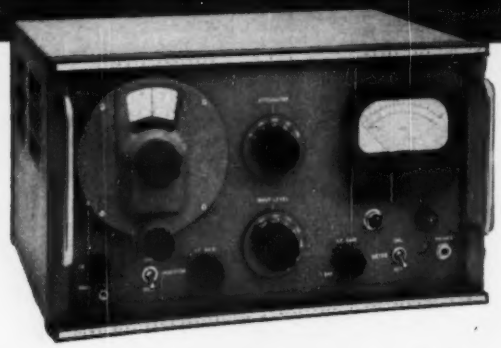
YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

Fast, convenient, dependable

precision wave analyzers

for wave analysis, wire carrier and microwave subcarrier measurements



Sierra 121A Wave Analyzer is a double superheterodyne receiver covering 15 KC to 500 KC. It provides data directly in volts and dbm at 600 ohms, and offers high selectivity required for single sideband carrier measurements.

Sierra 158A Wave Analyzer is similar to Model 121A but covers 500 KC to 10 MC.

Both instruments have ±2 db accuracy, spurious response at least 50 db down, and signal measurement range of 77.5 μv to 97.5 volts. Available for either cabinet or relay rack mounting.

Frequency-selective carrier-frequency voltmeters

For carrier frequency and other field or laboratory work between 3 KC and 800 KC, Sierra offers five accurate, stable tuned vacuum tube voltmeters. All are direct reading in voltage and dbm at 600 ohms from —80 dbm to +42 dbm. All feature built-in calibration oscillators, level calibration circuits, aural monitoring jacks, and (except 103B) precision spiral scale dials. All are ruggedly constructed of quality components for long operating dependability.

SPECIFICATIONS — SIERRA VOLTMETERS

Model	Frequency Range—kc	Selectivity		Accuracy		Direct Reading in dbm	
		Down 3db	Down 45db	Frequency	Measuring	Balanced	Unbalanced
101C	20-500	± 550 cps	± 2900 cps	Note A	± 3 db	Note D	600 ohms
103B†	3- 40	± 400 cps	± 3000 cps	± 0.5 kc	± 3 db	Note D	600 ohms
104A	5-150	± 300 cps	± 1500 cps	± 1 kc	± 3 db	Note D	600 ohms
108B	15-500	± 550 cps	± 2900 cps	± 3 kc Note B	± 2 db Note C	135 ohms Note D	600 ohms
114A	100-800	± 550 cps	± 2900 cps	Note A	± 3 db	Note D	600 ohms

† Contains carrier re-insertion oscillator for monitoring suppressed carrier systems. Furnished with planetary drive dial. Note A. Ranges from ± 2 KC at low end of dial to ± 3 KC at upper end. Note B. ± 1 KC in the 48 KC to 256 KC region. Note C. ± 1 db for + 30 db to —40 db attenuator steps on 135 ohm balanced measurements. Note D. All models may be converted for 135 and 600 ohm balanced line measurements by convenient plug-in bridging transformer, Model 130D.

Data subject to change without notice.

Sierra Electronic Corporation

Division of Philco Corporation

4694W Bohannon Drive • DAvenport 6-2060

Menlo Park, California, U.S.A.

Sales representatives in Major Cities

Canada: Atlas Radio Corporation, Ltd., Toronto, Montreal, Vancouver, Winnipeg
Export: Frazar & Hansen, Ltd., San Francisco, New York, Los Angeles

Jaw Clamp Ammeters . . .

(*Continued from page* 113)

the three or six ranges, depending on the model selected.

Western Electro-Mechanical Co, Inc, 300 Broadway, Oakland 7, Cal.

Meter Socket . . .

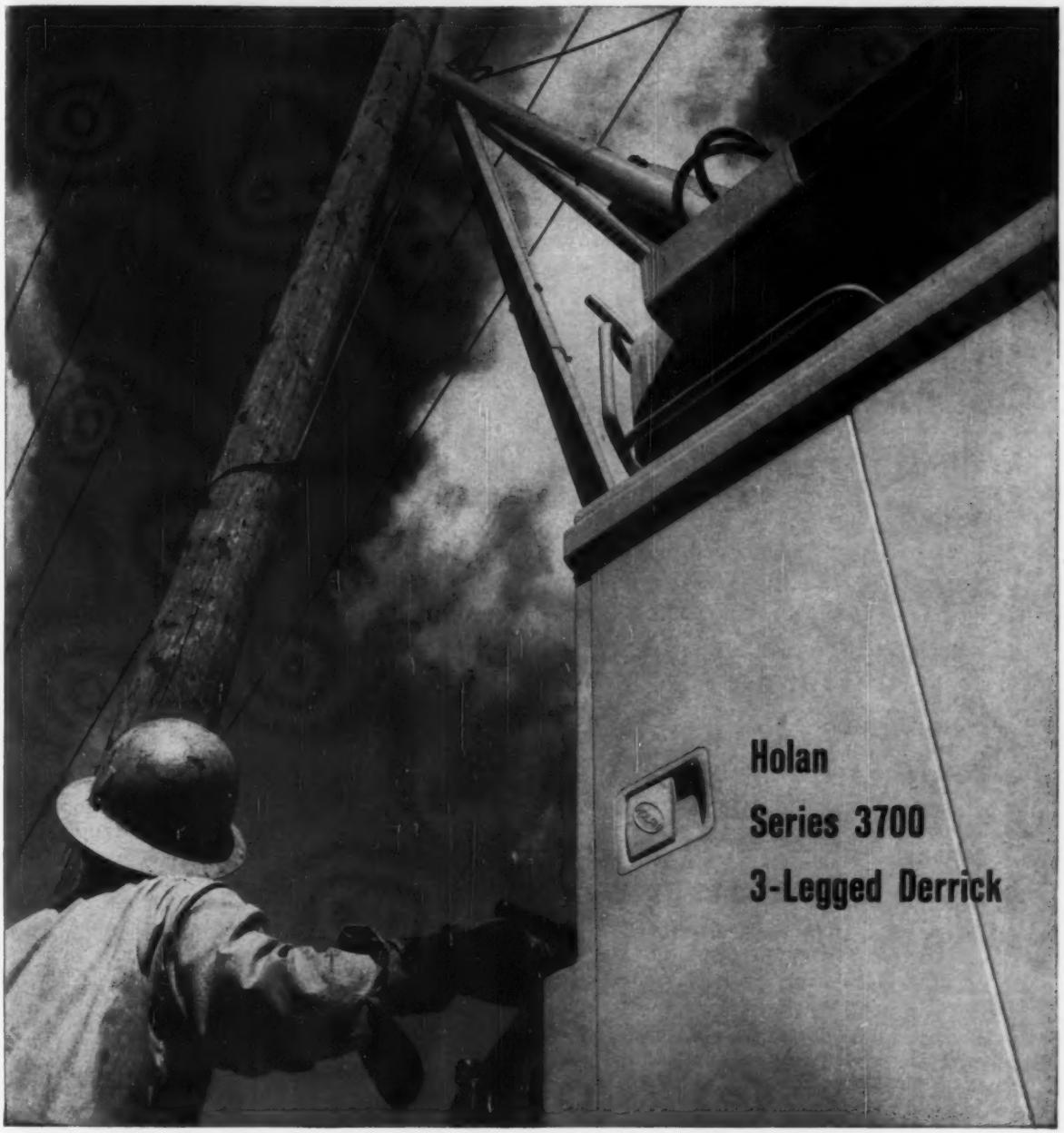
. . . and load center accommodates up to eight single-pole or four double-pole branch circuits. The 100-amp unit has lugs suitable for both copper and aluminum conductors. Ratings for the device (Cat. No. TRM810MFR2, MR2) are 120/240 v ac, single-phase, 3-wire.

General Electric Co, Circuit Protective Devices Dept, Plainville, Conn.

Warning Light . . .

. . . for use on service trucks can be obtained in numerous light patterns and colors. Inside its plastic lens, which is available in amber, red, half amber and half red, blue or clear, are four sealed beam bulbs. By using different combinations of bulbs, the frequency of beam pat-

(*Continued on page* 118)



Ask the man who operates one

Second orders for the Holan Series 3700 Derrick are not too difficult. Once a utility uses it in the field, there's no question about the product.

Our specs tell you the 3700 has a 12,000-pound capacity and lifts 75-foot poles. Actually, it's been tested at 22,000 pounds and handles longer poles. It also hoists 5,000 pounds over the rear axle for body-loading and has a 195° operating range. And you have plenty of power for forcing diggers into hard ground.

This derrick has three legs instead of two—an integral middle leg gives extra strength and has you ready for butt-pulling, body-loading, and extra-heavy lifts at a moment's notice.

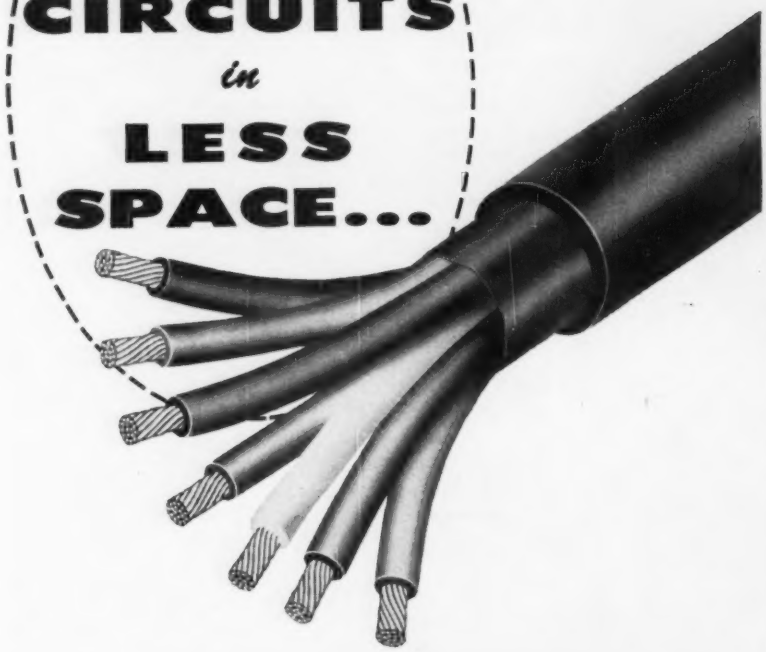
If you want assurance before you buy, don't ask us. Ask the man who operates one.

Holan Corporation, 4100 West 150th Street, Cleveland 35, Ohio
Plants in: Cleveland, Ohio; Griffin, Georgia; Phoenix, Arizona

Holan

Subsidiary of THE OHIO BRASS COMPANY

FOR MORE CIRCUITS *in* LESS SPACE...



Use SUPERIOR SD Control Cable

Superior's SD Control Cable provides for the maximum number of control circuits in the least amount of space!

Overall diameters are reduced by as much as 20% to 35% without any sacrifice of quality or reliability. Armored with tough nylon, the flexible, stranded, polyethylene-insulated conductors are color-coded to your requirements. Non-hygroscopic tape covers the conductor core. The smooth, neat, outer jacket of polyvinylchloride has excellent resistance to oils, acids, alkalis and solvents and eliminates the need for conduits.

For *more* circuits in *less* space, use SUPERIOR SD Control Cable . . . highly efficient, economical, too!

For complete information and prices, write

SUPERIOR CABLES

SUPERIOR CABLE CORPORATION

Hickory, North Carolina

4028

Warning Light . . .

(*Continued from page* 116)

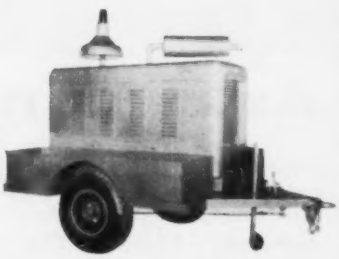
terns can be set at 30, 60, 90 or 100 light impulses per min. It is known as No. 211.

R. E. Dietz Co, 225 Wilkinson St, Syracuse 1, N. Y.

Load Break Lever . . .

. . . **provides strength** to break even the largest links. The lineman is aided by a mechanical ratio of 5:1 in breaking the link. At the same time, the cutout contacts are held closed by the upward thrust to prevent contact arcing. The load break lever does not interfere with the operation of the cutout when interrupting its maximum fault current capacity.

Hubbard and Co, 200 S Michigan Ave, Chicago 4, Ill.



Emergency Power . . .

. . . **units deliver 3-phase** or single-phase power. The engine generator of the mobile "Versa-Trailer" is available in three sizes—15, 25 and

(*Continued on page* 122)

WAGNER Dry-Type *General Purpose* Transformers

...WHISPER WHILE THEY WORK

New... from Wagner... totally enclosed dry-type transformers *filled with epoxy compound*. Their designation: Type AE Single Phase, 1 to 10 Kva.

Use these transformers for all general purpose applications, including those where noise must be minimized. They have a low sound level... the result of encasing smaller Form W core and coils in solid epoxy compound. The compound insulates, reduces sound-producing vibration caused by core excitation ... and provides enough support and mechanical strength to eliminate the need for metal framework and other subassemblies that are subject to vibration. *The result:* a whisper-quiet transformer that can be used anywhere, even in quiet areas of offices and hospitals.

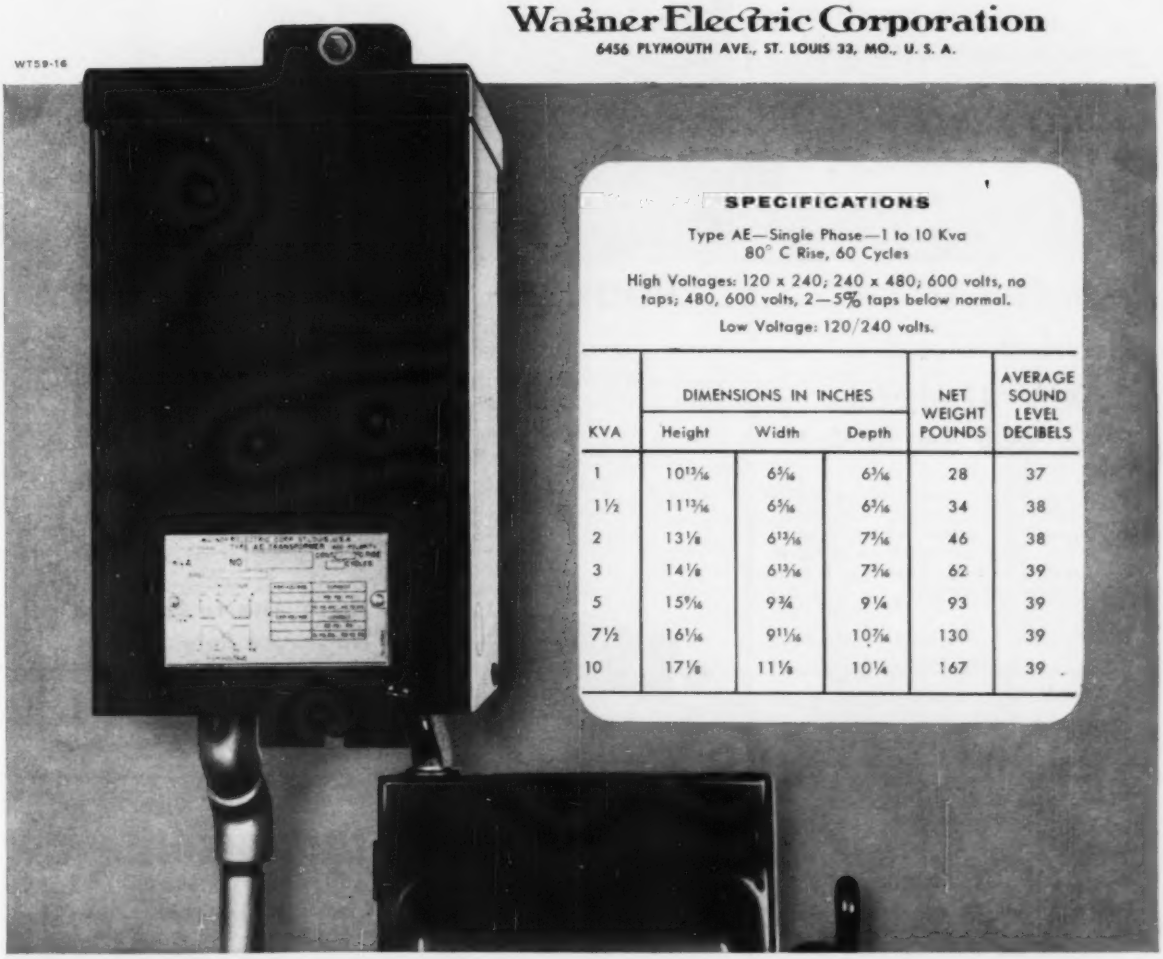
Wagner Type AE transformers do more than silence sound, of course. They improve voltage regulation, and have better insulation protection (suitable for continuous operation at 80°C in a 40°C ambient). All parts are sealed from dust, moisture and corrosion by the epoxy compound. Naturally, every unit is built to conform to all applicable standards of ASA and NEMA.

Wagner Type AE transformers can be installed indoors or out... in any location where they will not be submerged or exposed to injurious fumes in concentration. They are compact and lightweight and can be mounted in any position, at any angle... on walls, floors, or ceilings.

Like to know more? Wagner branches and distributors have all the details. There's one near you. Call or write now.

Wagner Electric Corporation
6456 PLYMOUTH AVE., ST. LOUIS 32, MO., U. S. A.

WT59-16



SPECIFICATIONS

Type AE—Single Phase—1 to 10 Kva
80° C Rise, 60 Cycles

High Voltages: 120 x 240; 240 x 480; 600 volts, no taps; 480, 600 volts, 2—5% taps below normal.

Low Voltage: 120/240 volts.

KVA	DIMENSIONS IN INCHES			NET WEIGHT POUNDS	AVERAGE SOUND LEVEL DECIBELS
	Height	Width	Depth		
1	10 13/16	6 5/16	6 3/16	28	37
1½	11 13/16	6 5/16	6 3/16	34	38
2	13 1/8	6 13/16	7 3/16	46	38
3	14 1/8	6 13/16	7 3/16	62	39
5	15 5/16	9 3/4	9 1/4	93	39
7½	16 1/16	9 11/16	10 7/16	130	39
10	17 1/8	11 1/8	10 1/4	167	39

Readers Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested.

NEW EQUIPMENT

Line Material .....Open Cutouts ☐
GE .....Indoor CT ☐
Sprague Electric .....Capacitors ☐
Hubbard & Co.....Rack ☐
Westinghouse .....Governor ☐
Heiland Div. .....Oscillograph ☐
R. D. Fageol .....Safety Light ☐
Irwin Auger .....Wood Bit ☐
Associated Research .....Tester ☐
Western E-M .....Ammeter ☐
GE .....Meter Socket ☐
R. E. Dietz.....Warning Light ☐
Hubbard & Co..Load Break Lever ☐
U. S. Motors....Emergency Power ☐
Code Equipment..Meter Mounting ☐
Stephens-Adamson ....Car Puller ☐
Ideal Electric.....Vertical Motors ☐

MANUFACTURERS LITERATURE

Code No. .....

(Requests are made from code numbers on page 108).

OTHER

Manufacturers Editor
Electrical World
330 W. 42nd St.
New York 36, N. Y.

* **Note: Requests must be received within four weeks of publication date, accompanied by complete information specified. This service cannot be offered to readers in foreign countries or to competitive manufacturers.**

NAME _____
TITLE _____
COMPANY _____
ADDRESS _____

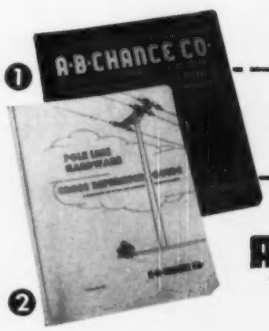
FOR:
Reference ..... ☐
Specs ..... ☐
Trial ..... ☐
Purchase ..... ☐

NOVEMBER 16, 1959

HOOKS on TOP—BOLTS on BOTTOM

It's as simple as that to install. The top hook slips over the guy wire without the groundman stretching. A single bolt at the bottom fastens the guard to the guy rod, the guy wire or the guy loop. Guy guards that are easy to install are easy to get installed where and how you want them.

808 guards are available in 7 and 8 foot lengths in both galvanized steel and aluminum. Turned-in edges give added strength and safety.



Use these Aids to Pole Line Hardware Selection:

❶ Chance U-48 Catalog.
❷ Pole Line Hardware Cross Reference Guide.

CPS9-13A

A. B. CHANCE COMPANY
CENTRALIA, MISSOURI
A. B. Chance Co. of Canada, Ltd., Toronto

PG&E Ups Output of Feather River Stairway of Power

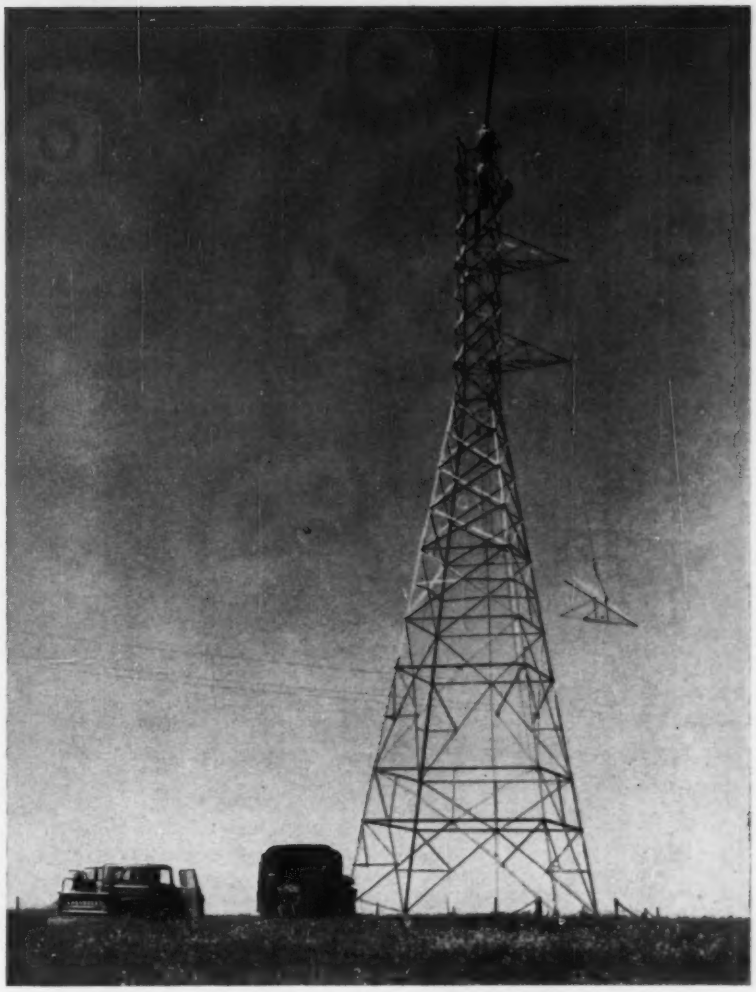
200-mile steel tower line built to deliver output of three new hydro plants to distribution point

The North Fork of the Feather River is California's mightiest source of hydroelectric power. PG&E aptly terms it a "stairway of power."

Tumbling down from Lake Almanor in the Sierras, its waters spin the turbines in nine Pacific Gas & Electric Company generating stations. Three of these plants went into service in 1958, adding 251,000 kw and bringing total generating capacity of the Feather River development to 635,800 kw—half again the requirements of a city the size of San Francisco.

200-MILE LINE . . . Construction of the three new stations—Poe, Caribou No. 2, and Butt Valley—required a new, 200-mile, 220-kv transmission line. It runs from Feather River Canyon via Rio Oso Substation near Marysville to Tesla Substation, a PG&E transmission system crossroads southwest of Tracy. From there the power is channeled to power-consuming centers in Northern and Central California.

1018 STEEL TOWERS . . . The double-circuit, 220-kv towers were detailed, fabricated, and galvanized at Bethlehem's South San Francisco Tower Shop. Ranging up to 150 ft in height, the towers required 8,200 tons of steel. Most conductors are of 61-strand, 1,113-mcm all-aluminum construction.



PG&E crewmen use a floating gin pole to hoist an assembled crossarm section.

THREE TOWER SHOPS . . . Tower and switching station requirements from coast to coast are supplied from three Bethlehem shops. Two are operated on the West Coast, at South San Francisco and Seattle. The huge Bethlehem shop at Leetsdale, Pa., near Pittsburgh, serves requirements east of the Rockies.

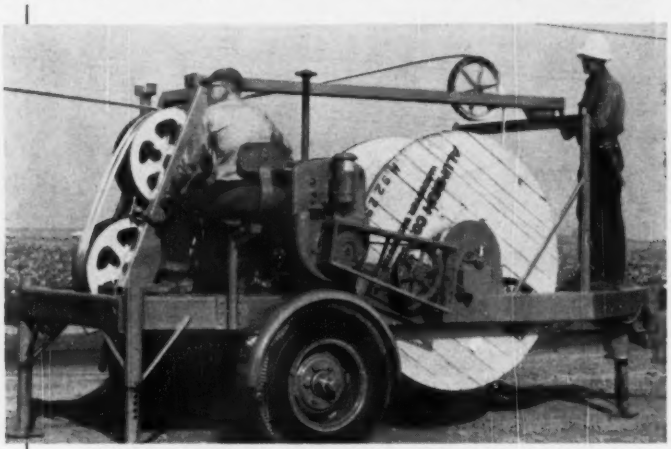
Looking for a reliable supplier? Bethlehem's many years of service to the nation's leading utilities attests to our ability to fulfill your requirements for all types of transmission structures. We'd appreciate the opportunity to discuss your current needs. Please contact the Bethlehem sales office nearest you.

This simplified map shows the route of the new transmission line from a point near Lake Almanor to a distribution center east of the Bay area.

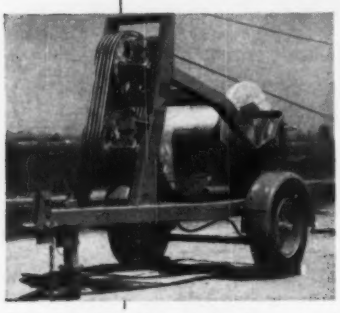
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

Now–A budget priced **PENGO TENSION STRINGING "TEAM"** for faster, safer, lower cost wire stringing!



NEW PENGO 5500 BWCP TR-I bullwheel cable puller pulls single conductor or pulling line, at tensions to 1,700 lbs. at 3 mph in high gear, or to 3,100 lbs. in low. Takes reels to 44" wide by 69" diameter. Neoprene-lined bullwheels take manila rope to 1¼" diameter; or smaller pulling lines and conductors. Powered by 25 hp gas engine; 2 man operation. Ideal for use with PENGO 5000 series tensioners (see below).



PENGO 5000 STR-I-34 combination tensioner and reel dolly has Neoprene-lined bullwheels to take conductor sizes up through .96 (565, 500 CM), handles reels to 34" x 72". The PENGO 5000 STR-I-54 is similar but larger and stronger, for larger and heavier reels to 44" x 72"

Here's a chance to gain all the economy, speed and safety of *tension* wire stringing at an investment that won't strain your line construction equipment budget.

The new PENGO 5500 Bullwheel Cable Puller pictured above, teamed up with a PENGO 5000 series tensioner, gives you a wire-stringing combination that keeps the conductor in the air all the way, makes it easier and safer to string over energized lines.

PENGO tension wire stringing equipment is available for any size conductor, for all stringing conditions. You'll be hours and dollars ahead to consult us *now* on planned line construction. We invite your inquiry.

New PENGO-MILLER Line Stringing Swivels

Special models of the well-known MILLER swivels have been redesigned specifically for tension line stringing use, through collaboration between Petersen Engineering Co., Inc., and Miller Swivel Products, Inc.

The result is a reliable, heavy duty swivel of proper dimensions to pass through stringing sheaves and bullwheel grooves easily, without damage.

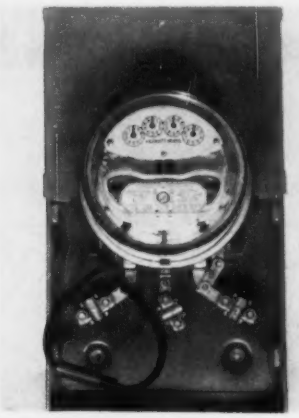
PETERSEN
ENGINEERING CO., INC.
Santa Clara, California

G-11

Emergency Power . . .

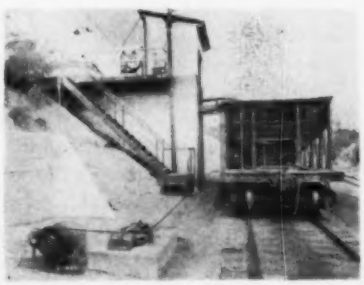
(*Continued from page* 118)

35 kw at 80% power factor. Three-phase voltages are 240 v, 3-wire; and 120/208 v, 4-wire. Single-phase voltages are 120 or 240 v, 2-wire; and 120/240 v, 3-wire.
United States Motors Corp, Oshkosh, Wis.



Meter Mounting . . .

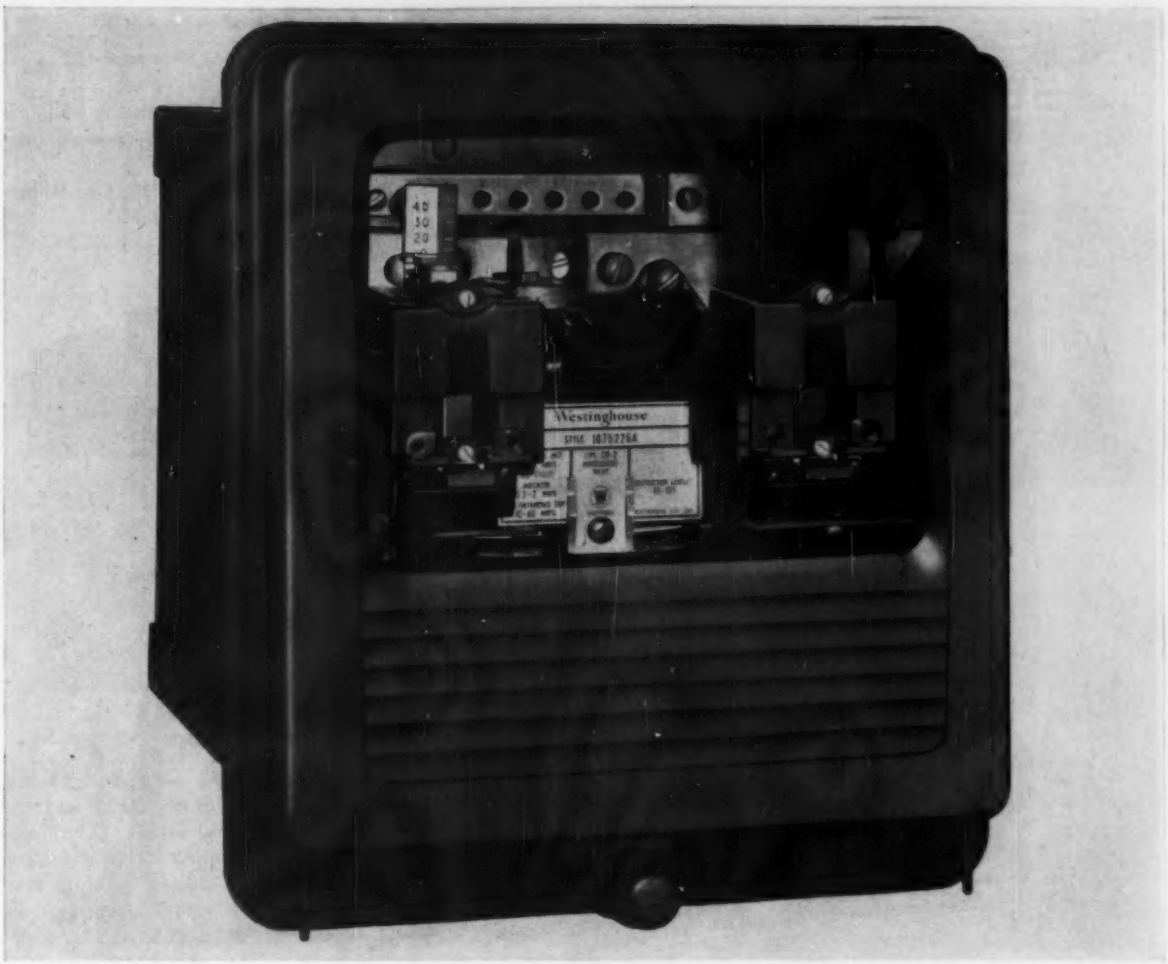
. . . has bypass feature to assure service continuity when meter has to be removed or tested. A split cover permits removal of the seal and lowering of the bottom section of mounting. Both 100-amp and 200-amp mountings are available.
Code Equipment Sales Co, 222 Kalos St, Philadelphia 28, Pa.



Car Puller . . .

. . . brings the power of a locomotive to one-man car spotting jobs. In addition, the No. 14H Car Puller provides greater safety to personnel. There are no ropes to snub, and the wire rope dead ends directly

(*Continued on page* 124)



Westinghouse announces improvements on famous universal Flexitest relay case

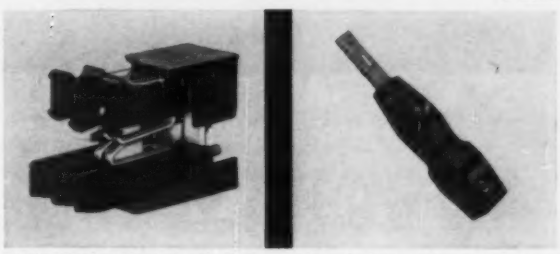
J-40524

Design refinements which we've added to the new universal Flexitest* case provide users with an even greater measure of convenience, safety and dependability.

Improved, positive latching of the chassis in case; a new design ammeter test plug; new make-before-break switch; stronger switch jaw blocks and longer barriers all combine to offer ease in use and maximum safety in testing.

The Flexitest case gives you all the advantages of dust-proof protection, an easily removable cover, projection or semi-flush mounting, and the removable chassis permits rapid relay replacement without panel wiring changes. Compare these exclusive Flexitest features with any other units available. Then call your Westinghouse salesman; he'll be glad to help you put these advantages to work for you.

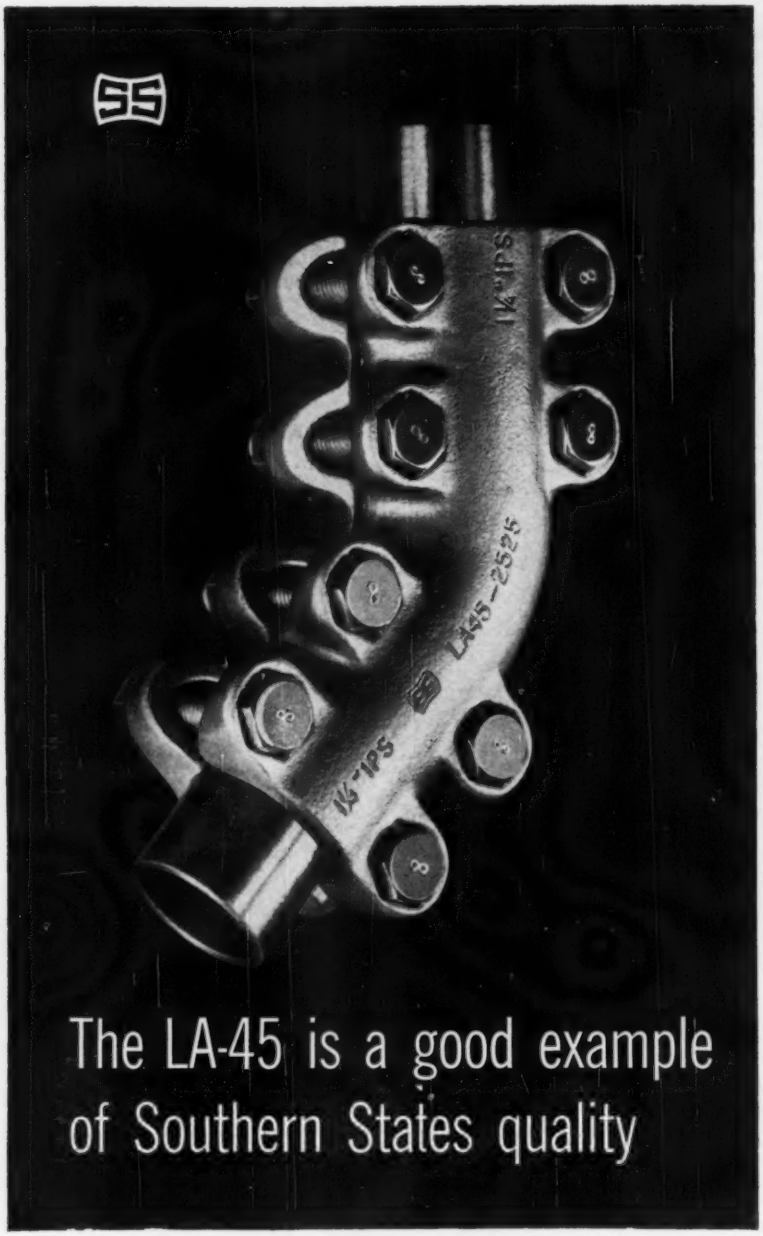
*Trade-Mark



- Redesigned current circuit blade has been lengthened to provide more positive contact action.
- New design blade handles ride more easily through switch barriers.
- Longer switch barriers provide better "dead-front" protection.
- Molded jaw blocks have been further strengthened.
- New design test plug automatically and positively limits blade travel.
- This new plug can be used with any existing Flexitest switch facilities.
- The indentation on the test blade assures positive lock-in.

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS



The LA-45 is a good example of Southern States quality

Close examination of the design and construction of this 45° elbow connector will reveal many of the qualities common to Southern States fittings: silicon bronze hex-head bolts, recessed for one-wrench installation; rough-ground contact surfaces; extra ruggedness without excess bulkiness; good design.

Southern States also offers a full line of weldments.

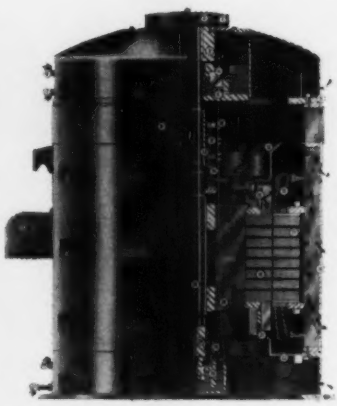
SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA Dominion Cutout Co., Ltd., Toronto

Car Puller . . .

(*Continued from page* 122)

into the drum. The unit is weathertight and requires no special housing.
Stephens-Adamson Mfg Co, Ridgeway Ave, Aurora, Ill.



Vertical Motors . . .

. . . in wound rotor designs are offered in ratings of 150 hp and up, frames 584 and larger. They are designed for applications requiring high starting and accelerating torques with low inrush current or an adjustable speed control. In addition to standard A, B and H insulations, a number of special materials such as silicone rubber and acrylic and epoxy resins can be supplied. **Ideal Electric and Mfg Co, Mansfield 48, Ohio.**

More New Products

Low silhouette Oil-tite **pushbuttons** (Type OT2) have minimum projection in front of the panel. They can be used to control any electrical machinery and equipment. —Westinghouse Electric Co, Box 2099, Pittsburgh 30, Pa.

Across-the-line **magnetic controls** for constant speed motors in NEMA sizes 0 and 1 for single and polyphase operation are rated up to 7½ hp at 220 v and 10 hp at 440 and 550 v. The Model 58 controls feature epoxy-encased coils.—Arrow-Hart & Hegeman Electric Co, Hartford, Conn.

Your new power plant or expansion idea

Location correct?

Capacity adequate?

Readily financed?

Timely?

Kaiser Engineers designs and builds a wide variety of power plants and nuclear facilities.

Among KE's most valued services are sound, searching economic analyses, feasibility studies and site evaluations. In a word—*Pre-Engineering*—impartial, outside analysis which helps you decide whether to proceed with, defer or modify the project.

Kaiser Engineers offers you cost-saving, time-saving, one-company service from concept through start-up.

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• KE projects include work in Ghana, Japan, Puerto Rico, Vietnam, as well as the United States. They encompass such diverse assignments as nuclear fuel analysis, a nuclear research center, plutonium production reactor, steam-electric power station and a hydro-electric plant.

5459-P

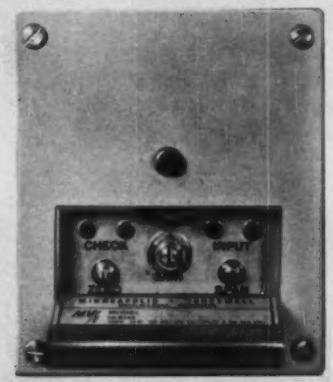
Telemeter and record

...with Honeywell Instruments

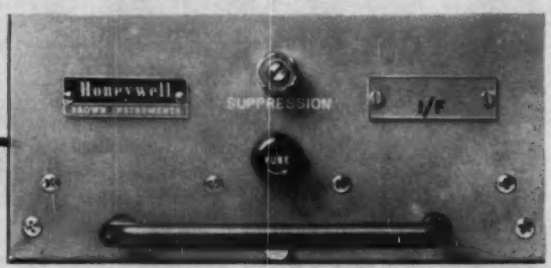
Combine the reliability and accuracy of the new Honeywell telemetering system with the traditional excellence of *ElectroniK* recorders . . . and you have an unbeatable combination for handling central station data.

Use the fully-transistorized telemetering system for load, control intelligence, or any variable that can be transduced into an electrical signal. It's designed to meet all central station requirements, and is suitable for carrier, microwave or direct-wire line channels.

Use *ElectroniK* instruments to record and indicate all telemetered variables with speed, precision and sensitivity . . . to give a clear, continuous,



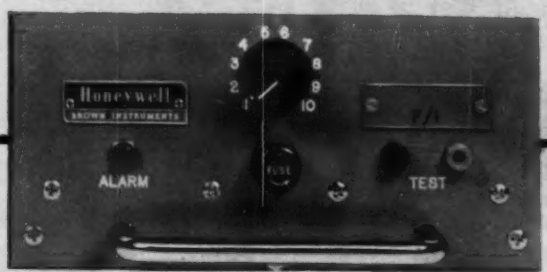
Millivolt-to-current transducer converts the mv signal of the sensing element to current.



Current-to-frequency transmitter converts current to a transmittable frequency that is a measure of the original variable.

HONEYWELL TELEMETERING SYSTEM . . . FULLY TRANSISTORIZED FOR GREATEST LONG-TERM RELIABILITY

Modular construction makes possible the unusual flexibility of this advanced telemetering system. The three basic units—transducer, transmitter, receiver—can be used in various combinations to provide the exact type of telemetering you need. The basic units mount two-abreast in standard relay racks. This fast-responding, frequency-type system gains stability and compactness through all-transistor design.



Frequency-to-current receiver converts the transmitted signal for recording and/or control purposes.

all variables...

permanent record of system operation.

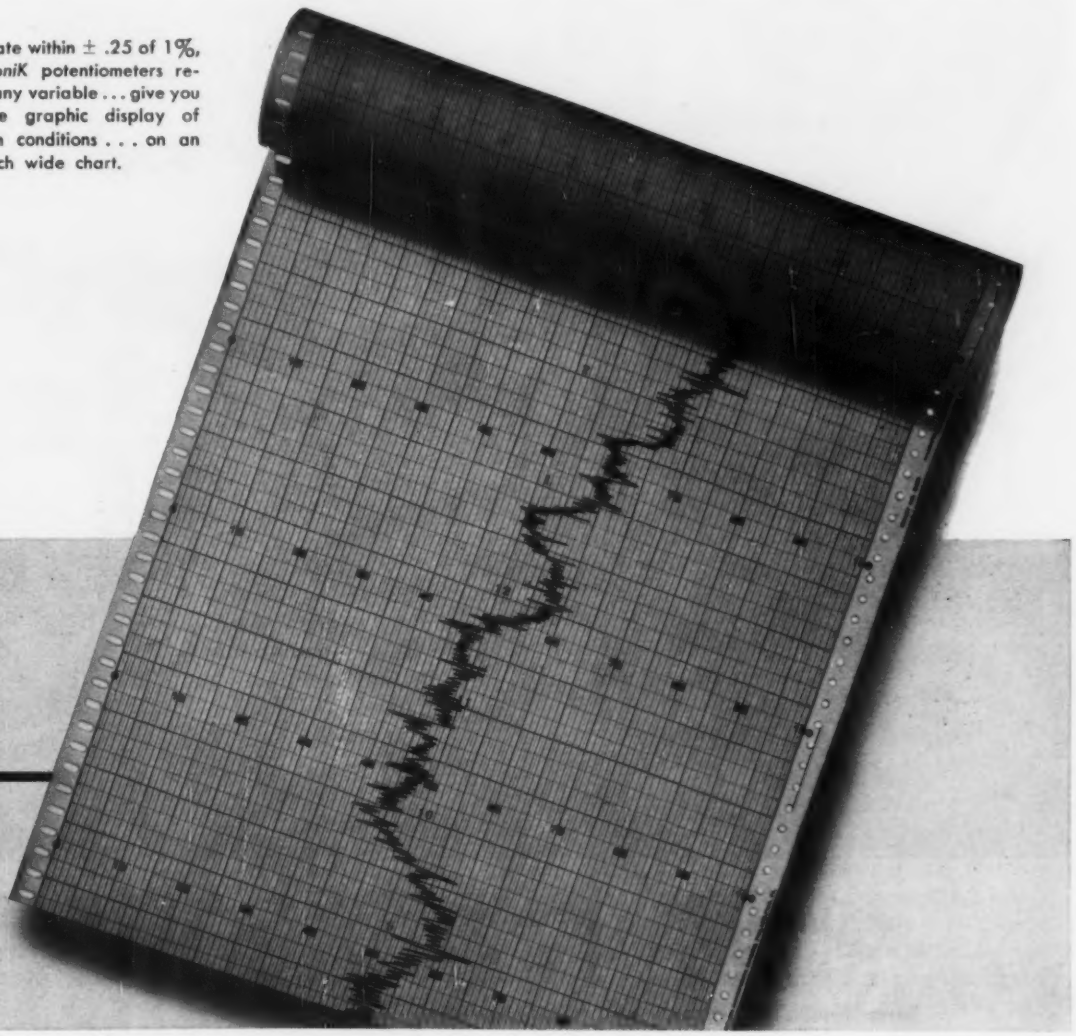
Your nearby Honeywell field engineer can help you match the telemetering system and *ElectroniK* recorders to your requirements. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

First in Control

Accurate within ± .25 of 1%, *ElectroniK* potentiometers record any variable . . . give you precise graphic display of system conditions . . . on an 11-inch wide chart.



Why Kaiser neoprene-jacketed cable was used in Lincoln Tunnel signal system

The Lincoln Tunnel requires a myriad of signal lights to regulate traffic under all conditions. For this complex system of circuits the designers specified multi-conductor cable manufactured by the Bristol Works of Kaiser Aluminum and Chemical Corporation. The cable is jacketed with Du Pont neoprene.

The time-proven performance of neoprene led to its use in this installation. The designers wanted a flexible, easily installed cable with an abrasion-resisting jacket to protect the conductors against rough handling. And they wanted a jacket that would give long-term protection against deterioration by exhaust fumes. They got what they wanted with neoprene.

The results of countless installations prove you can be sure of lasting performance when you specify neoprene jacketing for wire and cable. For details, write to: E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. EW-11, Wilmington 98, Delaware.

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Better Things for Better Living . . . *through Chemistry*

Utilities have a big role in . . .

Building Balanced Communities

Report on
Area
Development

There's a lot more to area development than peddling industrial sites. This was made plain late last month when Edison Electric Institute's Sixth Annual Area Development Workshop drew together in Phoenix, Ariz., a group of top professional area development men from the electric utility industry. In fact the direct business of industrial promotion—often assumed to be synonymous with area development—was seldom mentioned. Instead, the emphasis was placed on balanced community growth and on the important part that electric utility companies can play in bringing it to their service areas.

This theme was outlined by Harllee Branch, Jr, president of the Southern Co, and reinforced by area-development experts from inside and outside the utility industry. Furious note-taking was noticeable among the approximately 100 area development men in attendance as Branch gave his views on where their specialty fit into the overall picture of the utility business. Branch emphasized that an area development program should embrace all facets of the community if it was really to be worth while. "An effort should be made not only to increase the industrial skills and opportunities of the people," he said, "but also to improve their cultural and spiritual capacities and their sense of civic and political responsibility."

"We need only to look around us at some of the industrial jungles which have grown up in America with their climates of crime and conflict, delinquency and decadence, to realize how industrialization without intellectual and spiritual leavening can result in community deterioration rather than community development," he went on. "Such a program which is limited to industrial promotion and which expects to have its success measured in terms of new factories, new jobs and increased per-capita income, is not only unlikely to produce lasting benefits, but may actually prove self-defeating. No prudent industrialist will

risk his capital and his economic future in any community where churches and schools and civic enterprises have not first been able to succeed."

Where do the utilities fit in? According to Branch, the utility company is obliged by its very nature to have an active area development program. Because the utility is anchored to its service area, the only ways for it to grow are through the attraction of new customers and the increased use of electricity by those already there. On a strict dollar-and-cents basis, area development activities pay dividends in increased sales and revenues and in increased investor interest in the company's securities. But, Branch pointed out, there's more to it than that. A good balanced area development program also results in higher employee morale, a better relationship with the public, and valuable insurance against the encroachments of government power. Even more important, it bestows the sense of creative participation in civic affairs on all who take part.

What sort of man should direct the utility's area development program? As might be expected for a job he considered so important, Branch set a rigid specification. "This executive," he said, "must possess a broad range of interests, a talent for public relations, the ability to work with others and the ability to inspire others to work together among themselves; a practicality that directs his flights of imagination toward down-to-earth plans and attainable goals; the ability to plan logically, carefully and thoroughly; versatility so that he can work with many and varied groups and agencies at home and in other sections of the nation; the ability to know how to select and work with experts and specialists. In other words, the qualifications of an area development executive should closely approach those of the chief executive of a utility company."

The utility area development man is often looked upon for leadership by the local development agencies, and this increases his responsibilities and the importance of his job. Robert H. Ryan, former chairman of the Area Development Division of the Committee for Economic Development, told the group that the number of these local agencies is increasing every year, but that they lack coordination. "In most communities I know," he said, "utilities are regarded as having the public interest at heart. There is a natural opportunity to step into the existing vacuum of leadership and tie the local programs together."

Ryan delivered some personal impressions of a yet-to-be-published CED survey aimed at finding out what the local area development groups are up against and what they are doing about it. The survey, based on 4,500 replies, showed that urban obsolescence, metropolitan sprawl, and chronic labor surplus are among the most vexing problems facing the local groups. In the cities, he said, a movement is going on away from the downtown core and into the periphery of the metropolitan area. This is not only because more land is available there, but also because of greater accessibility to existing customers, suppliers, subcontractors, employees, and the labor market in general. "The central city," said Ryan, "is becoming the place where the poor people live."

The survey showed that a welter of new organizations is growing up to try to cope with the ever-mounting problems of community planning. But the planning often seems to be neglected. In fact, the local groups surveyed spend almost 4½ times as much money for promotion as they spend on fact-finding and planning. And the privately-financed agencies spend a smaller proportion of their funds for planning than do the public area development bodies.

Attracting new industry led the list of their area development activities by a wide margin. In a poor second place was the objective of helping existing industries to expand. In evaluating their programs, 60% of the groups reported success while 12% reported failure. The most-frequently-mentioned obstacles

in the way of successful area development were listed as: Insufficient funds, insufficient personnel, lack of interest and participation not only by the general public, but also by business leaders.

Ryan asserted that billions of dollars are needed for urban development. He stressed, however, that the biggest need that was turned up by the survey was "the need for better mechanisms to coordinate private and public decision-makers so that they can arrive at conclusions." And, he noted, "People are looking more and more to the utilities to show leadership and to act as a catalyst for the good life."

One of the utilities' biggest jobs of area development is just convincing the public that there is a need for it. Milton I. Allen of Philadelphia Electric Co told the group: "Above all utilities must educate the people of the community as to wherein their economic development lies. And it is the function of the utilities to point the way toward developing and exploiting the advantages and removing and correcting the disadvantages of its particular service area."

Getting a residential community to want industry is particularly difficult. In order to do this, Philadelphia Electric stresses the advantages of balanced community development. The company tries to get across the point that a community which is solely residential soon faces the prospect of either exorbitant taxes or bankruptcy, while the orderly introduction of some commercial and industrial enterprises can relieve the residential tax burden and provide money for better schools and other municipal services. "We have to show them that although a situation may not be good for some, it is good for the area as a whole," said Allen. "Until grass-roots local groups are educated area development doesn't mean a thing. Area development depends on getting the communities developed first."

Industries already located in the community should not be overlooked, Allen cautioned. "At first thought," he said, "it might seem strange to include existing customers [among the prospects for industrial development]. But actually, this phase of the work is . . . very productive. When the necessity for expansion

becomes apparent, all too often the unavailability of land makes it impossible. Unless promptly aided by the utility and those cooperating with it, the growing firm starts looking elsewhere."

Utilities should give special attention to zoning, Allen indicated. He noted particularly that land adjacent to turnpikes, railroads, or main traffic arteries should be considered for industrial use and so zoned. If no one has put over the advantages of balanced community development to the people, however, such parcels of land—which would make ideal industrial sites—are often lost through sale to residential developers or because of protests by citizens who do not realize the value of industry to their area.

The attitude of the people in the community is a big factor in site selection from the point of view of the company that is shopping for a new location. "If the attitude is one of wanting industry," Allen said, "it is probable that the area will receive favorable consideration."

Further support for balanced area development came from outside the industry. Willard V. Merrihue, manager of community and business relations for General Electric Co, explained how his company evaluates communities as locations for new plants. GE considers the traditional prerequisites for a plant site—such as access to markets, raw materials, transportation, power and fuel, water and utilities, labor supply, wage rates, and physical climate. But the company also takes a long look at some intangible qualities of the site that go to make up the local business climate. These include the efficiency of the state and local governments, productivity of the labor force, effectiveness and impartiality of law enforcement, adequacy of housing, cultural and educational facilities. And among the most important qualities of all, the attitude of politicians and the public toward business—Will the company face discriminatory taxes? Harassing regulations? Work restrictions?

GE favors communities where organized area development activities exist, Merrihue said, since this indicates that the community is making an effort to improve the business climate. Just how important a part this business climate plays in area development shows up in one GE policy mentioned by Merrihue. With 190,000 of GE's 250,000 jobs now in northeastern states where the business climate is deteriorating, he said, the company is setting employment ceilings in the various divisions departments, and sections. As they grow beyond these ceilings, elements are being relocated in other parts of the country.

BAY FRONT STEAM GENERATING PLANT LAKE SUPERIOR DISTRICT POWER COMPANY *80,000 kw — 6 Units*

Power on Lake Superior . . .

Lake Superior District Power Company is following a program of continual expansion in Northern Wisconsin and Upper Michigan to keep pace with the area's rapid recreational and industrial development. A modernization project recently completed at the Bay Front Steam Generating Plant resulted in the installation of 65,000 kw of modern generating capacity. This expansion program follows closely an aggressive promotion of electric power. This policy has been influential in increasing the residential use of electricity to more than 25% above the nation's average.

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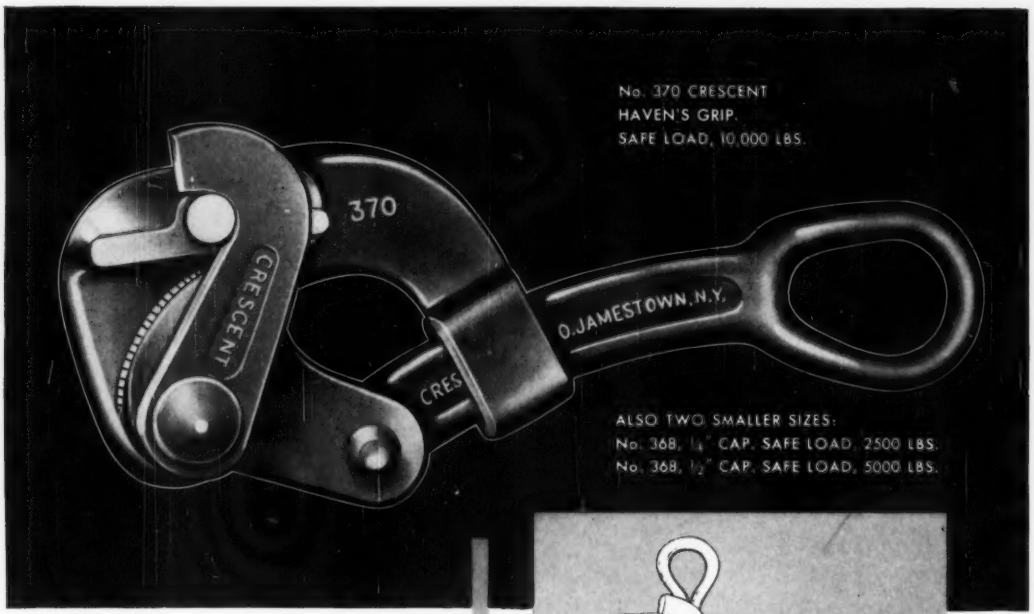
Here's a NEW LARGE CAPACITY CRESCENT HAVEN'S GRIP



● No. 370 Haven's Grip has been added to the Crescent line in answer to insistent demand for greater capacity in these proven grips. Its capacity of 9/32" (.282) to 13/16" (.8125) will accommodate many sizes and types of wire.

Note that this grip incorporates a safety latch which not only prevents it from falling off the wire, but adds greatly to its structural strength. Like all Crescent Grips, No. 370 is forged from special alloy steel, carefully heat treated and finished in Cadmium plate.

Parallel jaws assure a positive grip that will not injure wire. Jam-proof, instant releasing. Four sizes, with either smooth or serrated jaws, 5/16" to 1-1/16" capacity — up to 12,000 lb. safe load.

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

Dehumidifier Campaign Has Utility Hopping

A dehumidifier sales campaign which started out with a modest quota of 300 units caught on like a fire in a forest and ended up with 3,102 sales.

Basic starting problem in the campaign at United Illuminating Co, according to Laurence A. Dunn, vice president, was to educate the sales department on the job it could do, then educate the public on what a dehumidifier could do.

Next question was what brand to use. The company selected a manufacturer who was interested in a dehumidifier promotion and whose product carried a 5-year unconditional guarantee.

The utility decided on a free trial. Less than 1% were returned as unwanted.

Advertising-wise, they hit on the idea of having the "water eaters" placed in company windows filling wading pools. (See photo).

Another sales aid was the fact that the weather broke for the power company. One of their salesman got the idea that by relating a temperature curve to a humidity curve he could almost predict when the sales would take an upward trend. The company figures it can use this in future campaigns.

Soon after the promotion broke, the company found itself calling for more and more dehumidifiers. In talking to their distributor before the campaign, he said, "Why don't you buy 100 for Bridgeport, 100 for New Haven and we'll hold a hundred for you in reserve—just in case a miracle happens."

The miracle happened, Dunn says. During the first week in July (the campaign ran from June 1 to Sept. 1) the company sold 336 more units than its original quota. Dealers sold dehumidifiers which had been in stock for two and three years. One dealer who sold two dehumidifiers in 1958, sold 63 in 1959.

UI needed three girls to handle phone orders. Some days 150 orders came in and there was often a backlog of 40-50 orders.

One customer bought 11 to protect her art work and tapestries. Builders took them to dry up new houses . . . the company's distribution department bought them for substations . . . units were purchased for pump houses and wells.

"A list of industries which bought dehumidifiers looks like a volume of 'Who's Who'," Dunn reports. It includes printers, paper box manu-

Here's the Campaign at a Glance

For the customer
- 15-day free trial
- Special price—$89.95 (regularly $119.95)
- Free delivery

Campaign period
- July 1-Aug. 15, 1959
- Extended to Sept. 1

Advertising
- Regular newspaper schedule (dailies, weeklies)
- Radio—3 stations used daily

For the dealer
- Billed $70, 15 days after delivery
- Units delivered by parcel delivery service
- One dehumidifier and display consigned

Quota
- 300 units

Results
- 3,102 dehumidifiers sold
- 2,002 of make utility sells
- 1,100 other brands

facturers, banks, universities, and photographers.

One trade publication reported the campaign sold over 1,200 units. Dunn said that figure must have been given out early, because it was reached at the halfway mark.

What made the promotion such a success? Dunn credits, aside from the hot weather, the free trial. A 15-day free trial was offered to customers in the home. "After the customer emptied the first pails of water, he was sold and he sold his neighbor," Dunn reports. "Dealers who had never gone into any promotion with UI before came begging for dehumidifiers."

The company consigned one dehumidifier to the dealer for display. It was delivered by a parcel delivery service and after the 15-day free trial the company billed the dealer. He collected from the customer, kept $20.00 and sent the balance to UI.

The promotion was backed by newspaper ads, UI's Day by Day (a bill insert) window banners, and window display and point-of-sale displays.

CP&L Holds Electric Heating Campaign

Central Power & Light Co has joined forces with South Texas appliance dealers in a two-month electric heating campaign. Both reverse-cycle window air-conditioning units and portable electric space heaters will be promoted.

A $25 customer dividend certificate will be offered, and will apply toward the purchase price of window heat pumps, 1 hp or larger.

CL&P is holding heat pump service meetings for air conditioning and electrical representatives.

Emerson Electric Enters Heating Business

Emerson Electric Mfg. Co, which has been in the electrical manufacturing business since 1890, recently embarked on an intensive electric heat program. Emphasis will be put on marketing research, extensive training and promotional programs with utilities, architects-designers, builders, electrical contractors, distributors and dealers. Close attention will also be paid to research, development, engineering and production of a complete line of electric heat, W. R. Persons, Emerson president reports.

"At the present time, electric utilities are 'key' factors in the promotion of electric heat to consumers, but the long-range success of electric heat depends upon the manufacturer's acceptance of the responsibility . . . to develop and design a good product and a hand-in-hand working relationship with architects, builders, electrical contractors, distributors and dealers in order to achieve the ultimate in electric heat performance . . ." he said.

Persons also said that the company has tied its over-all future planning to the "tremendous future potential of electric heat."

Experiments are being initiated at present in Emerson's research and development laboratories on product design, building construction, insulation requirements, heat loss and maintenance costs for varying geographical regions. From this the company expects to develop a full line of engineered products to meet all varied applications throughout the United States.

Emerson is at present engineering and producing a complete line of electric heat including cable, baseboard units, in-the-wall inserts, heat pumps and radiant, convection, infra-red ceiling and wall heaters.

Watch Competitors, TVA Distributors Told

Do a more adequate job of selling electric power or face the threat of increasing natural gas sales, TVA electric power distributors were urged recently.

J. W. Johnson, manager of the Municipal Utilities Board at Albertville, Ala, told delegates to a Tennessee Valley Public Power Assn that "our competitors in the natural gas field are actively selling and we are not doing an adequate job of selling."

It is conceivable that low power rates may be jacked up as hydro-electric locations are fully developed and TVA turns more and more to steam plants. "We are not occupying the prominent position we were 10 years ago," he warned, and urged delegates to "get off the fence" and sell electric power.

A Kentucky co-op manager told how electric cooperatives in the state put five major electric appliances in home economics departments of every public school in Kentucky. "This is a means of educating future homemakers in the use of electric appliances," he said.

Farmers are turning more and more to automatic feeding of livestock, John M. Johnson, University of Tennessee extension service, said.

SELLING BRIEFS

Best year for appliance sales has been predicted for 1959 by Richard J. Sargent, vice president, Westinghouse Electric Corp. Sales will top the previous high of $8 billion, he said.

Electric dryers will be promoted in a "Buy-Try Plan" sales campaign by the Sacramento Valley Electric League, dryer distributors and the Sacramento Municipal Utility District. Promotion offers money-back guarantee to customers, and $20 reimbursed to dealer if dryer is returned. Homeowners will be reimbursed up to $50 for any additional wiring costs. Salesmen will get $2 for each 220-v dryer they sell.

Electric heating will be featured in discussions at convention of the National Warm Air Heating and Air Conditioning Assn in St. Louis Dec. 2, 3 and 4. John Norris, president, Lennox Industries, will present the viewpoint of the ducted air heating and cooling industry, and E. O. George, vice president, Detroit Edison Co gives plans and attitudes of electric industry with respect to electric heating.

Completely transistorized portable tv receiver may be on the market before the end of this year. The battery-operated set which has a 17-in. tube has batteries which can be plugged into any electric circuit and recharged as many as 40 times.

AT HOME OR ABROAD...

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Among Ebasco's growing activities in the nuclear field are these major projects:

IN AMERICA, for the U. S. Atomic Energy Commission, a conceptual design of a 306,-000-kw boiling water nuclear power plant; for the AEC's Knolls Atomic Power Laboratory, engineering, design, inspection of construction, and preparation of operating manuals for the off-hull facilities for the prototype of the first nuclear powered destroyer; and for the Southwest Atomic Energy Associates, consulting nuclear engineering for the development of an advanced thorium reactor system.

OVERSEAS, for SENN in Italy, engineering and construction of a 150,000-kw nuclear power plant; and for the Japan Atomic Energy Research Institute, engineering, design and inspection of construction of a 12,500-kw nuclear power plant.

Wherever you may be planning to utilize atomic energy, Ebasco's nuclear experience can serve you well. Along with Ebasco's 54-year reputation for uncompromising quality in general engineering and construction, it can be your assurance of practical and economical results.

Ebasco performs the following nuclear engineering services for clients:

- ★ Reactor Systems Evaluations
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- ★ Hazards Analyses
- ★ Start-Up and Testing of Plants
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- ★ Engineering and Economic Investigations
- ★ Research and Development Assistance
- ★ Nuclear Investment Consultation
- ★ Coordination with Government Agencies

For more information about Ebasco's nuclear engineering services, write Ebasco Services Incorporated, Dept. M, Two Rector Street, New York 6, N. Y.

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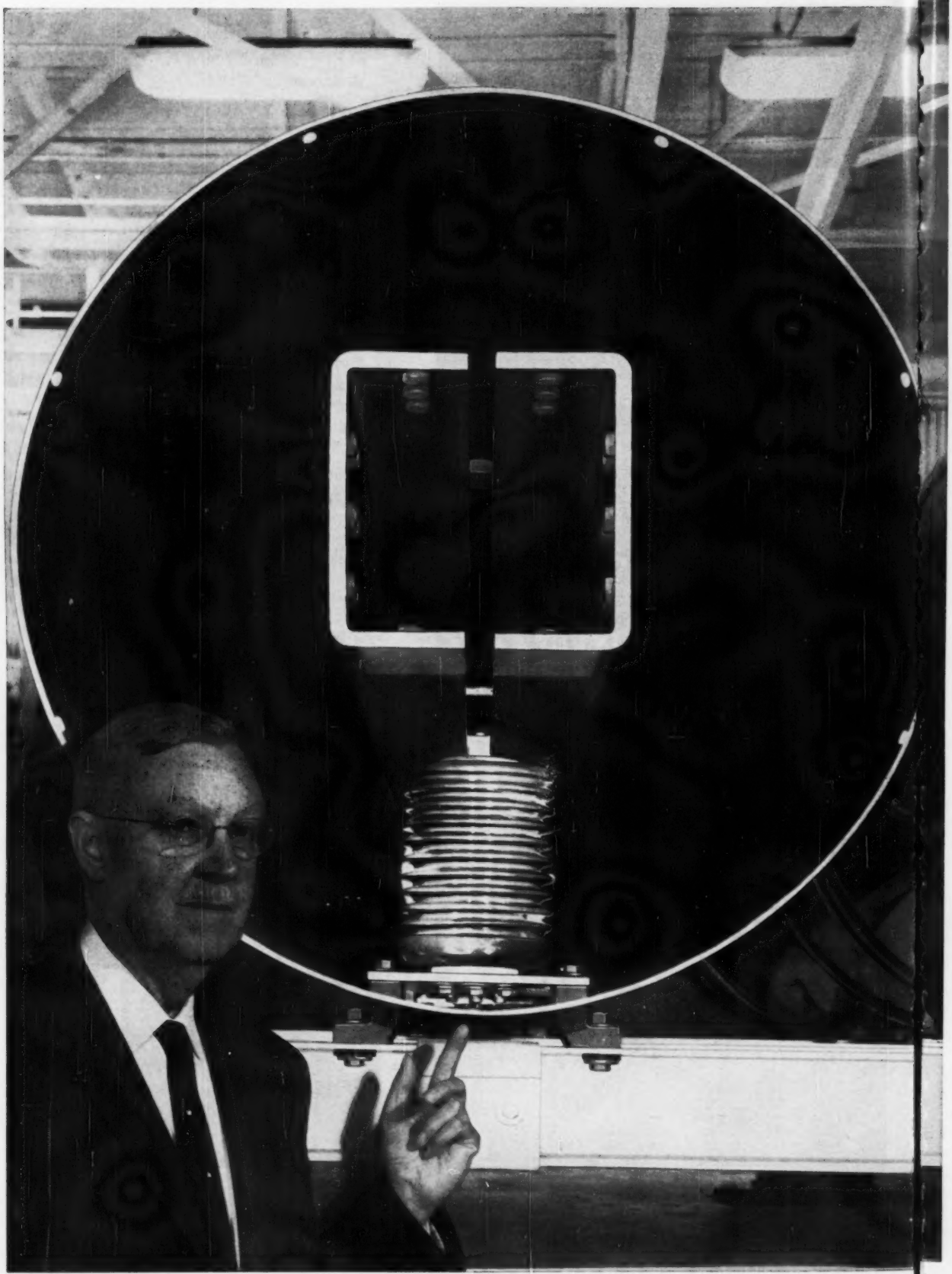

Only Westinghouse offers all these Bonus Values in new Isolated Phase Bus

Single Insulator for Most Reliable Insulation. Use of the single insulator support minimizes the number of vulnerable points for electrical failure. Minimum short circuit stresses on insulator assured by the shielding effect of the aluminum enclosures. Resiliency of mounting brackets further limits stress on supporting insulators.

Dust-Tight Sealing Assured. Longitudinal gaskets have been eliminated. Multiple-line contact of gasketing assures perfect seal against moisture or dust entering enclosure, which maintains insulation level.

Enclosure Easily Welded in the Field if Desired. No extra parts required to weld telescoping sections for completely sealed installation initially or at a later date. The aluminum bus can also be welded for solid or flexible connections at joints.

Unique Mounting of supporting feet eliminates openings through the enclosure that would require subsequent sealing.

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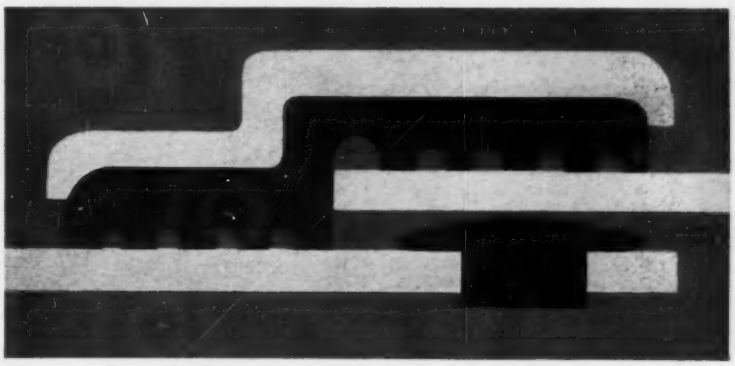

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Mr. H. H. Rugg, Assembled Switchgear Design Engineer, points out simple, sturdy support for Westinghouse Isolated Phase Bus housing and insulator.

Mexico Plans Capacity; Border Towns Boom

At least 2,500 Mw needed in next five years for industrial explosion; electricity import agreements arranged

The Mexican government's Federal Electric Commission estimates that the country will have to spend more than $900 million in the next five years to add at least 2,500 Mw more capacity. Of this dollar outlay, the FEC will spend more than $500 million, according to Manuel Moreno Torres, recently named FEC director, to keep up with the industrial explosion Mexico is experiencing despite some economic tightening against inflation.

Foreign credits of $200 million will have to be obtained for the investment, Torres said. Japan has offered $50 million, Westinghouse Electric Corp $15 million, and European Common Market countries have made various offers. Japanese officials have visited Mexico to try and increase already considerable sales of heavy electrical equipment to Mexico.

The country's frontier cities provide the earliest examples of how and why the boom is developing.

Here are projects slated for three border areas:

- Long known as a "cow town" and a haven for tourists who want to catch a peek at Mexico, Nogales will get "industry" almost overnight. PEMEX (Petroleos Mexicanos, the government oil company) has announced it will construct an $8-million dollar anhydrous ammonia plant just across the line from Nogales, Ariz.

But there is a hitch in the location which PEMEX says is now being solved. The town (on the Mexican side) hasn't enough electricity for such a project.

Here is where the involved business of international import and export of electric power comes in. A Mexican company, Cia. de Servidios Publicos de Nogales, S.A., handles the importation of electric power from the U. S. via a U. S. company, Citizens Utilities Co of Nogales, Ariz., which gets a lot of its power from Tucson Hoover Dam clients.

Servicios. Publicos company imports around 1-million kwhr per month from the American company across the border. A PEMEX official said the new ammonia plant will initially need 2.1-million kwhr per month and later will increase this to 5-million kwhr.

- Mexicali—This is the capital of fast-awakening Baja California state. The electric utility there reports "business is booming . . . we can hardly keep up." The company, Cia. Industrial Electrica Mexicana, S.A., an affiliate of California Electric Power Co, just got a $1.2-million credit loan from the Export-Import Bank in Washington to keep its expansion moving. The company imports all the electric power for distribution from its parent.

C.I.E.M. imports and delivers the equivalent of some 75,000 kw capacity to its area now and hopes to increase this to 100,000 kw soon. The area served by C.I.E.M. is in the heart of Mexico's cotton fields and is a busy agricultural valley.

- Golden Triangle—Cia. Electrica Fronteriza, S.A., has signed a contract with the San Diego Gas & Electric Co for delivery of 60-million kwhr per year more across the border. The company already imports 100-million kwhr from the San Diego G&E company. This is the seventh time in the past 18 years that the Mexican company has asked for and received more imported electric power.

The San Diego company also exports directly to the town of Tecate which is noted for its big "Tecate" brand brewery. The new contract also calls for a peak load capacity increase on the Tijuana border meter from 15,000 kw to 25,000 kw. A San Diego G&E spokesman said that the Tijuana meter was the company's biggest delivery point and that the company Mexican sales are now about $120,000 dollars per month.

Five Federal Agencies' Capacity Hits 20,000 Mw in 25 Years

(Megawatts)

Fiscal Year Ending June 30	TVA[1]	Bonneville[2] Power Adm	Bureau[3] of Reclamation	Southwestern Power Adm	Southeastern[4] Power Adm	Total
1934	244	0	40	0	0	284
1935	244	0	40	0	0	284
1936	344	0	40	0	0	384
1937	408	0	375	0	0	783
1938	444	0	498	0	0	942
1939	480	0	695	0	0	1,175
1940	916	0	778	0	0	1,694
1941	1,010	194	778	0	0	1,982
1942	1,355	626	862	0	0	2,843
1943	1,620	830	1,204	0	0	3,654
1944	1,874	1,316	1,311	0	0	4,501
1945	2,182	1,316	1,311	70	0	4,879
1946	2,208	1,176	1,462	70	0	4,916
1947	2,208	1,176	1,462	70	0	4,916
1948	2,236	1,490	1,552	70	0	5,348
1949	2,379	1,598	1,707	70	37	5,791
1950	2,612	1,922	1,794	87	111	6,526
1951	2,665	2,354	2,124	157	246	7,546
1952	3,163	2,462	2,292	157	346	8,420
1953	4,310	2,747	2,380	381	744	10,562
1954	5,262	3,845	2,624	426	992	13,149
1955	6,975	4,023	2,952	426	1,031	15,407
1956	8,858	4,151	3,313	501	1,031	17,854
1957	9,030	4,702	3,549	501	1,126	18,908
1958	9,237	5,334	3,599	501	1,247	19,918

[1] TVA Owned Plants Only. [2] Includes Grand Coulee, Hungry Horse and Chandler. [3] Does not include plants operated by water users on Bureau of Reclamation property or reclamation plants whose output is sold by Bonneville. [4] Includes Cumberland River dams entire output which is sold to TVA.

Source: TVA Annual Reports, Interior Dept Annual Reports, Columbia River System Annual Reports, Hearings on Interior Dept Appropriation Bills; compiled by Edison Electric Institute.

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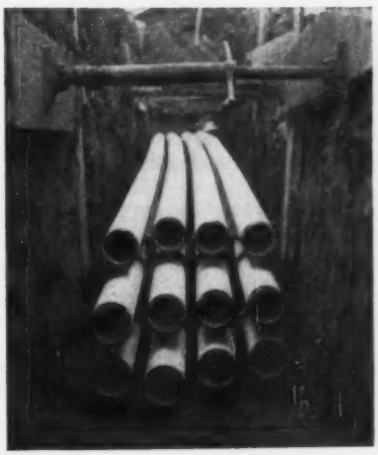

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CEI Names Rudolph VP-Marketing

Karl H. Rudolph, controller of Cleveland Electric Illuminating Co and head of its financial controls department, has been named vice president-marketing. He succeeds Robert C. Heinton who has been elected to the newly created office of vice president in the marketing group.

Rudolph was named controller last June. He joined CEI in 1942 as an accountant in the methods department and became department manager a year later. He has served successively as staff assistant to the president, manager of the performance analysis and budget department, and manager of the financial analysis and rates department.

Heinton, who began with the company as a salesman 32 years ago, will now specialize in promoting long-range territorial development and planning. He also will handle major marketing projects and will serve as a consultant to the marketing group.

In 1949 he became general sales manager and was elected vice president-marketing in 1953.

Duke Appointed to New 3M Vice Presidential Post

The new post of executive vice president for sales administration and public relations for Minnesota Mining & Manufacturing Co has been filled by the appointment of Joseph C. Duke. He moves up from executive vice president for the coated abrasives, adhesives and chemicals divisions. The shift is being made before the retirement at the end of the year of L. F. Weyand, executive vice president and director of sales. Also retiring is Arthur E. Eggert, vice president for public relations.

Duke began with 3M as a salesman of abrasives in 1921. He moved up through various sales jobs before becoming vice president and general manager of the coated abrasives division in 1948. The adhesives and chemical divisions became his responsibility in 1955. Two years later he was elected executive vice president and a director of 3M.

Succeeding Duke is C. C. March, formerly vice president for coated abrasives. J. F. Whitcomb has become general manager of this division.

Plath Becomes General Superintendent for Sierra Pacific

Sierra Pacific Power Co has appointed Neil W. Plath general superintendent. He replaces F. G. Barnett, vice president and general superintendent, who retired recently.

Plath has been assistant general superintendent of the Reno, Nev., power company since June, 1958. He started there in the electrical department in 1936 soon after receiving his electrical engineering degree from the University of Nevada. Following a 1942-46 hitch with the Corps of Engineers, Plath rejoined the company as construction superintendent. In 1949 he joined Stone & Webster Service Corp in New York as a management consultant but resigned this position in 1958 to return to Sierra Pacific.

Barnett, who was elected vice president in 1952, served with the utility 16 years.

(*More News About People on p* 144)

This Man Can Help You Get More Efficiency From Plant Equipment

Efficiency is what you want from your plant equipment, and the Dowell engineer can help you get it. Plants in every major industry—for example, oil refining, chemical, public utility, steel and paper—are getting productive results from *economical* chemical cleaning by Dowell.

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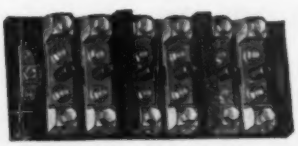

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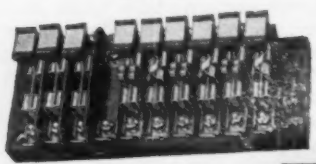

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Browder New Head of IES, Other Officers Elected

In a mail-in ballot by the nearly 10,000 members of the Illuminating Engineering Society, Joe B. Browder has been elected president of the group. He is assistant to the vice president in charge of sales and sales manager for Georgia Power Co, where he has worked since 1939. Browder succeeds George J. Taylor, Day-Brite Lighting, Inc, vice president.

Other new officers include: Vice Pres James R. Chambers, sales manager, lighting products division of Appleton Electric Mfg Co; General Secretary Charles W. McCormick, commercial sales manager, Connecticut Light & Power Co; Treasurer G. Franklin Dean, supervising engineer of lighting service, Toronto Hydro-Electric System.

PERSONAL BRIEFS

Potomac Light & Power Co named **Irvin V. Propps** to the merchandise sales staff.

Toledo Edison Co promoted **Robert A. Vick** to supervisor of the general tabulating department.

Carl J. Fuhrman, director of area industrial development for the Dayton Power & Light Co, has been elected vice president of Inlandia, Inc, and Inlandia Industrial Corp, units of the proposed Ohio inland free trade zone, which has set up headquarters in Columbus and a field office in Bellefontaine.

H. W. Teel, sales engineer with the Toledo Edison, elected 1959-60

chairman of the Northwestern Ohio section of the Illuminating Engineering Society.

Frederick C. Helwig promoted to transmission and distribution engineer in charge of over head lines, overhead standards, transmission and distribution design and underground activities of the Toledo Edison Co.

Promotion of **Robert L. Skone** to principal engineer—electrical design of Seattle City Light has been announced by Superintendent Paul J. Raver.

Metropolitan Edison Co appointed **Wilbur D. Hollinger** as assistant secretary and assistant treasurer and **David F. Krug** as system operating superintendent.

Donald R. Miller has been made assistant to Frank M. Warren, president, Portland General Electric Co.

Walter Leonchick joined the staff of the Argonne National Laboratory, Lemont, Ill., as an associate electrical engineer in the Particle Accelerator Division.

Leonard Cullison has been made business manager for Kansas Electric Cooperatives.

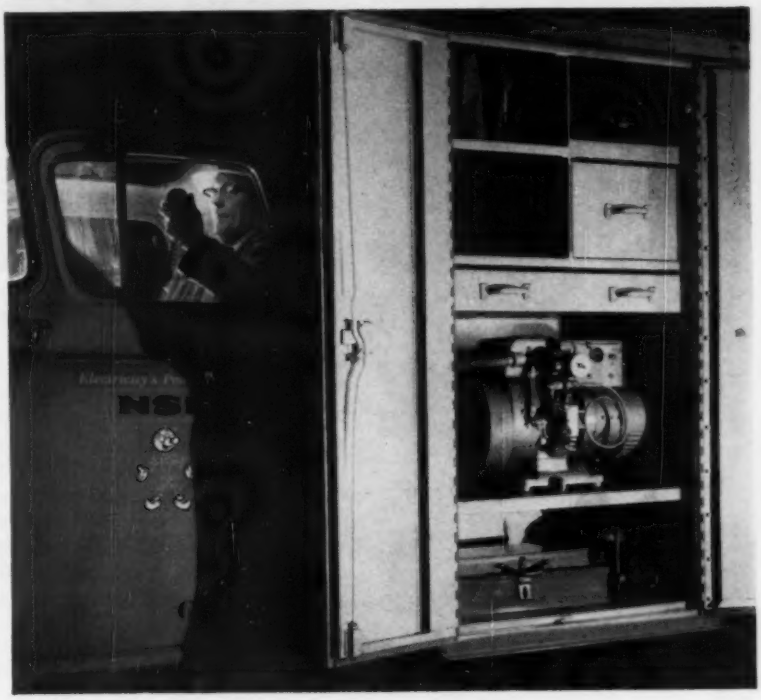
David Cass-Beggs, general manager, Saskatchewan Power Corp, has been elected vice president of the Canadian Electrical Assn. He is the first public power utility official to hold the office of vice president in the CEA.

Robert L. Reider has been appointed to fill a vacancy on the Ohio Public Utilities Commission. Earlier **Rep. Frances McGovern** had been appointed to the post but the appointment was rescinded when it was found that she had voted in the 1957 Legislature to increase PUC salaries.

United Kingdom Atomic Energy Authority has appointed **J. B. Adams** to be director of a new office to deal with controlled thermonuclear research.

Allis-Chalmers Manufacturing Co has made the following appoint-

Onan NEWS REPORT



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Utility construction and maintenance trucks like this one, use two kinds of auxiliary electric power . . . and the Onan Electric Plant provides both. Workmen can plug in on the plant for 2,000 watts of 115-volt, 60-cycle A.C. to operate electric tools like drills, saws, soldering irons and floodlights. Or the plant will deliver 30 amperes of 12-volt D.C. to handle the battery drain of 2-way radio and battery-powered lights.

The Onan's D.C. output makes it unnecessary to run the truck engine to keep batteries charged, making savings in fuel and engine maintenance totaling hundreds of dollars per year per truck.

Leading body builders now install these dual-purpose Onan plants on new vehicles or you can mount them on vehicles now in service. Onan's Vacu-Flo cooling system permits installation within a closed compartment. Where no space is available in the truck body, the plant can be neatly installed over the cab within a handsome weatherproof steel housing.

Dual-purpose utility models are available with either 1,000 or 2,000 watts A.C. Powered by smooth-running single-cylinder Onan air-cooled gasoline engine.

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ments: **Marvin O. Sherfey** and **Stephen A. Tomsic** to the Power Equipment Division; **Ronald R. Bukowski** as an assistant engineer in the nuclear power department; and **James C. Cockoft** as application engineer in the control department.

Wesley S. Block, Jr, former president of the Richardson-Allen Corp, has announced his resignation as chairman and board member. Block will devote his time to Wesley Block 6 Co, Inc, 170 Great Neck Rd, Great Neck, N. Y. This organization, he established in 1930, of which Richardson-Allen Corp was a manufacturing affiliate.

William J. Hagan III, formerly the assistant director of electrical conductor sales, appointed director of electrical conductor sales of the Southern Electrical Co, a metals division of Olin-Mathieson Chemical Corp. Other appointments include: **L. W. Carpenter,** manager of field sales, and **G. E. Thurman,** manager of sales promotions.

Westinghouse Electric Corp has made the following personnel changes. Formation of a new Portable Appliance Division to be headed by Vice President **Richard J. Sargent** has been announced. **O. H. Yoxsimer** becomes general manager of the company's Television-Radio Division at Metuchen, N. J., and **Richard S. Sheetz** as general manager of the East Springfield, Mass., appliance plant to succeed Yoxsimer. **Marion J. Kolasa** has been appointed district manager in Detroit for the Sturtevant Division. **H. W. Rainey, Jr,** is named general sales manager for the Sturtevant Division at Hyde Park, Mass., succeeding James W. Wilcock, who recently became manager of the division.

OBITUARY

James R. Kearney, Jr, president of the James R. Kearney Corp.

J. Coleman Jones, 58, general superintendent of Pacific Power & Light Co's five-state systems operations and construction division.

Henry Houck, 67, senior member of the Pennsylvania Public Utilities Commission.

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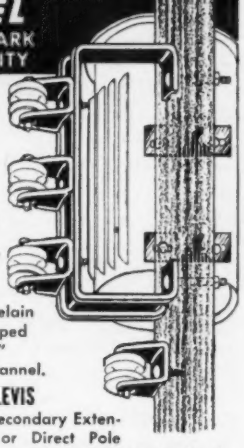

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SALES ASSIGNMENTS

COMPANY STAFFS

Graybar Electric Co has made A. L. Layer, district sales manager for the Ohio Valley. C. C. McGraw becomes manager of the Dayton, Ohio, branch. D. E. Clisbee has been appointed district sales manager, Gulf Coast district; M. A. Young, manager of the Fort Lauderdale branch; L. A. Womeldorf, manager at Knoxville; and R. F. Murtha, operating manager at Butte, Montana.

Okonite Co has named Sam R. Howard district manager of the Los Angeles district sales office.

Philco Corp has made Charles R. Burke district sales manager for Philco Transac computers in Kansas City, Mo.

REPRESENTATIVES

Metals Division of the H. M. Harper Co appointed Donald S. Eddy as sales representative.

Bermico Division of the Brown Co has made Russell P. Douct sales representative for the midwest area. He will cover the states of Ohio, Michigan, Indiana, Kentucky, Illinois, and Wisconsin. He will also be Brown's contact man with manufacturers' agents Burke-Graham of Minneapolis, Minn., E. R. Pauline & Sons of Des Moines, Iowa, and Craig Fross of Kansas City, Mo.

Yale Materials Handling Division, Yale & Towne Manufacturing Co has named Dees Equipment Co franchise representative for the sale and service of Yale industrial lift truck and tractor shovels in eastern, central, and northwest North Carolina. Belmont Equipment Co has been named franchised sales and service representative in southwestern Indiana, southeast Illinois and western Kentucky, and Southern Industrial Equipment Co for Florida south including the counties of Indian River, Okeechobee, Highlands and Charlotte.

Pittsburgh Standard Conduit Co has appointed Michael J. Korak and William L. Crossey of Korak-Crossey Co as sales representatives in the Chicago area.

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The catalog also lists ESCO JR detent-action switches with up to eight selector positions, handling 10 amperes at 125 volts a-c or 5 amperes at 125 volts d-c.

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Con Ed Wins Pollution Appeal

Consolidated Edison Co of New York got a new injection of hope last week in a much knocked-about attempt to cut air pollution caused by its Waterside Plant, by converting eight coal-fueled boilers to gas.

The Third U. S. Court of Appeals (Philadelphia), to which Con Ed appealed in April, has ordered the Federal Power Commission to issue a certificate to Transcontinental Gas Pipe Line Corp to transport up to 50-million cu ft daily of gas from Texas—where Con Ed would buy it directly from producers—to New York. An additional FPC hearing on "minor rate matters" also was required by the court.

Gas Ok for Boilers

The court's action upsets a February FPC ruling which had denied the Con Ed, Transco plan, on the ground that gas should not be wasted on "inferior" uses, such as boiler fuel. The implications of the court's ruling—strongly attacked by the FPC and coal interests—could produce a softer approach in the commission's traditionally tough attitude against boiler use for gas.

An appeal to the Supreme Court is almost certain.

The Appellate Court remanded the case to FPC "with directions to issue the certificate applied for, subject to further hearings on a minor question of rates." These rates had been left unsettled by FPC when it had decided that the entire project was unjustified.

The commission, in a 4-1 decision (Commissioner John Hussey dissenting), had denied the Con Ed proposal on two grounds: (1) Transco's pipeline capacity would be reduced for supply gas for more "urgent and beneficial public needs," such as residential space heating; (2) Con Ed's proposal to buy directly from gas producers might start a trend among other utilities, forcing field prices up.

These two factors, ruled the FPC majority, "tipped the balance" against the project, even though Con Ed's request to use gas to reduce air pollution was "an appealing one." FPC, in denying the Con Ed plan, also reversed an intermediate decision by Presiding Examiner William J. Costello that how the gas would be used should not be a factor in the case.

The Appeals Court said that FPC had exceeded its authority in attempting to discriminate between "inferior" (boiler fuel) and "superior" (space heating) uses. There is no difference, said the court, between apartments heated by steam from gas-fired boilers of Con Ed and gas heaters in single residences.

The court also agreed that Con Ed's arguments for air pollution abatement had merit. Waterside is near the United Nations headquarters. The UN—along with nearby residents and Pollution Director Dr Leonard Greenburg—appealed to Con Ed and the FPC for use of gas-fueled boilers to cut the soot and pollution.

Now the FPC says that the court overstepped its bounds in ordering the commission to issue a certificate for the gas transportation service. That's strictly the FPC's responsibility, claims FPC General Counsel Willard Gatchell: "Suppose the commission, in holding the necessary extra hearings on rates, finds other reasons for denying the certificate? What then?" Gatchell also feels that the Appellate Court got away off base in discussing the commission's "attitude" and rights over conservation and end use of gas.

Coal Interests Object

Coal interests are up in arms over the court ruling. Natural gas, except for a few notable exceptions, has been traditionally limited by the FPC to primary use for residential heating, leaving coal and oil to compete for industrial sales.

In one case, the FPC allowed Coastal Transmission Co to transport Texas gas to Florida for use in utility boilers, but this was justified because, without the particular boiler sales, the pipeline company would not have been able to build its line. And in another recent case, an FPC examiner has submitted an intermediate decision that El Paso Natural Gas Co should be allowed to sell up to 100-million cu ft of gas daily to Southern California Edison Co for use in Los Angeles to reduce smog.

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Wanted — Graduate Electrical Engineers — Electric Utility in North Jersey area. Some experience in transmission and distribution desired. Please answer giving education, experience and salary expected. P-2345, Electrical World.

Administrative Engineer — Must have background in electric or gas utility field with successful record in supervisory or managerial capacity. Administrative ability essential. An unusual opportunity for a man with Electrical Engineering or Mechanical Engineering degree to use and develop all of his capabilities. Will manage and be responsible for all operations in his district. Location — Southwest. Reply sending a complete resume to P-2981, Electrical World.

SELLING OPPORTUNITIES OFFERED

Representative wanted for manufacturer of street lighting equipment pole line specialties. Full particulars. RW-9821, Electrical World.

Manufacturer's Agent—To represent old, established manufacturer of high tension, wet process electrical porcelain specialties (no standard insulator line) in Eastern Pennsylvania, New Jersey, Metropolitan New York, Delaware and Virginia. In applying, please give age and send recent photo. RW-2770, Electrical World.

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1—6667 kva Westinghouse, 3/60/115,000Y/13750
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3— 75 kva G.E., 2400/4160Y—120x240
ERIE ELECTRIC CO., INC.
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WANTED: USED
Conductor Tensioning Equipment
In good condition, send specifications with reply.
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1500 KVA 4160 to 480V 3 phase Westinghouse type SL inerteen filled transformer 4—2½% taps Westinghouse distribution panel DB50—3 pole breakers 2000 a main bus—2—1200A 6—600A branch

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to expedite the handling of your correspondence and avoid confusion, please do not address a single reply to more than one individual box number. Be sure to address separate replies for each advertisement.

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Subsidiary of major oil company operating in Eastern Venezuela has career opening for an Electrical Engineer having the following qualifications:

B.S. E.E. plus minimum 3 years experience in one or more of the following: Process Plant Design, Medium & Low Voltage Distribution System Design, application of Switchgear & Protective relays, Applications of Telemetering & Supervisory controls.

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Portable electric test equipment
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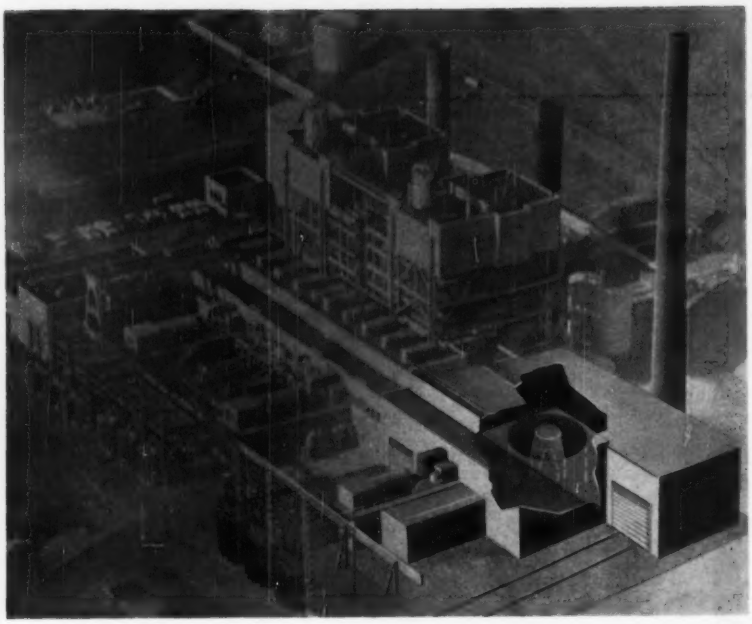

Pacific G&E Previews Proposed A-Plant

An artist's overlay on a photo of the Humboldt Bay power plant shows how Pacific Gas & Electric Co's proposed 60-Mw atomic power addition will look if approved by the Atomic Energy Commission and the California Public Utilities Commission. PUC hearings on the $20-million project began late last month. The outdoor turbine-generator is to the left of the reactor building. The two 50-Mw oil and gas-fired existing units are in the background.

At the hearings PG&E restated its confidence that the A-plant, with the second loading of uranium fuel, would produce power at costs competitive with conventional plants in the area near Eureka, Calif.

SoCal Ed Gas Supplier Ordered to Halt Sales

The Richfield Oil Corp has been ordered by the California Public Utilities Commission to cease selling natural gas to Southern California Edison Co's Mandalay station. The ruling became effective Oct. 29.

The PUC order follows an Aug. 4 decision that the Richfield firm was a public utility gas corporation. Last month's action stemmed from a series of proceedings before the PUC on formal complaints of Southern Counties Gas Co of California against both Richfield and SoCalEd.

The power company has been seeking a supply of gas for its steam plants in addition to that available on an interruptible basis from Southern Counties Gas and Southern California Gas Co. Dissatisfied with the interruptible service, SoCalEd also wishes to avoid use of oil for standby service because of the air pollution factor.

Richfield has been ordered to file a tariff for public utility gas service. It also must cease operating and maintaining a pipeline to the Mandalay station.

The 56-mile gas pipeline was built despite the protest of southern counties, which sought a court injunction to halt the project. The court held that the PUC had jurisdiction in the matter.

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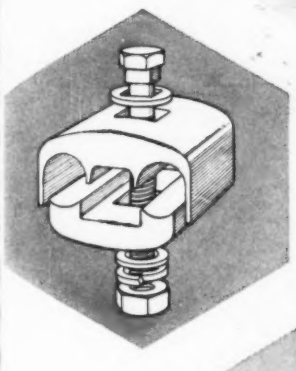
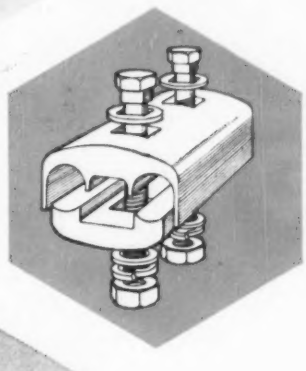
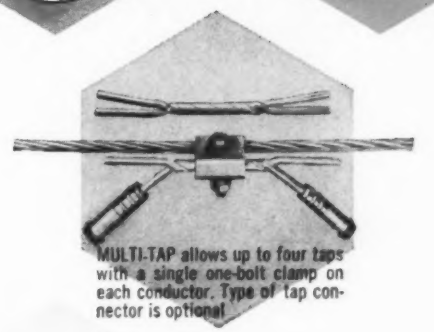
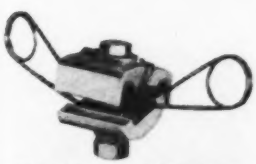






MULTI-TAP allows up to four taps with a single one-bolt clamp on each conductor. Type of tap connector is optional



HOT CLIPS, a reusable accessory, hold the line and tap sides ready for installation hot, using standard hot line tools.

DISTRIBUTION CLAMPS

EXTRUDED

MASS ANODE TYPE

The Design

Body and bridge align themselves to contain and contact all strands. All conductor combinations, even one max. and one min., are contacted with pressures exerted in *exact* opposite directions (always toward the core). Conductors are never distorted.

The Material

1. **EXTRUDED ALUMINUM** because conductivities are as tabled:

ALLOY	SUITABLE FOR	VOLUME CONDUCTIVITY (% International Annealed Copper Standard)
No. 6063 — Aluminum	Extrusions	55
No. 220 — Aluminum	Sand Casting	21
No. 356 — Aluminum	Die Casting	41
Alum Brz. (90 Cu., 8.9 Al., 1.0 Fe)	Casting	12.6
Copper Conductor	Draw	97
Aluminum Conductor	Draw	61-62

2. **EXTRUDED ALUMINUM** because shapes as designed are always true and the quality consistent.

The Bolt Galvanized Steel — Lubricated.
Square shank for 1 wrench,
Hex head for 2 wrenches

Types One and Two Bolt — Four Sizes

LINE	TAP
1/0-8	1/0-8
4/0-2	4/0-2
336.4-1/0	336.4-1/0
336.4-1/0	1/0-8

The coefficient of linear expansion closely matches that of aluminum conductor, minimizing any ratcheting effect when brought through cycles of heating and cooling. The design of the clamp, based on the mass anode principle, reduces galvanic corrosion to insignificant proportions. This eliminates the need for copper liners for copper to aluminum connections.

Reliable

ELECTRIC COMPANY
Franklin Park, Illinois

A Symbol of Integrity Since 1909

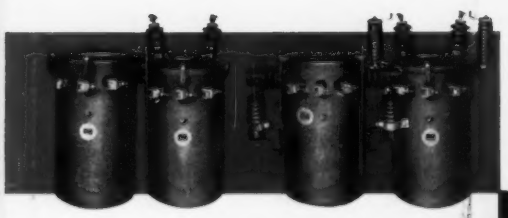
DESIGNED FOR PERFORMANCE

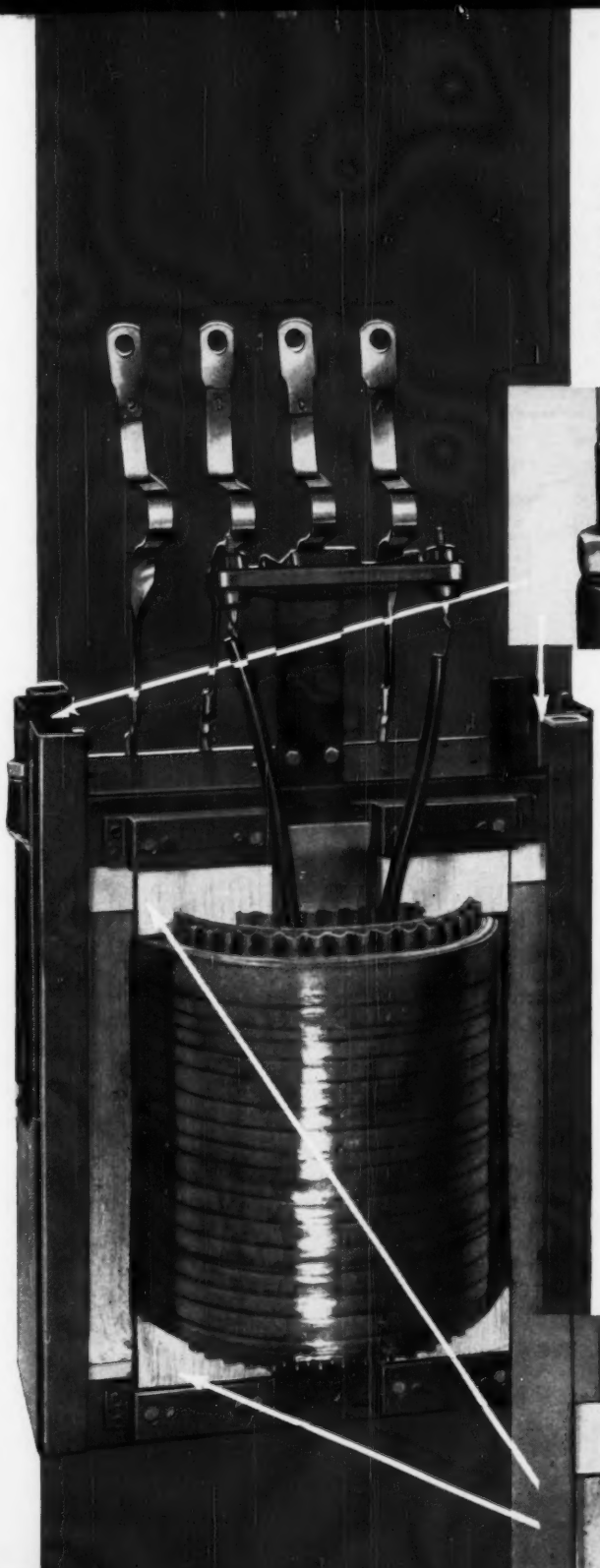
MOLONEY DISTRIBUTION TRANSFORMERS

The unique combination of the Moloney Core, a low impedance coil, sturdy frames and adjustable blocking gives the user of Moloney distribution transformers efficiency, economy and long service.

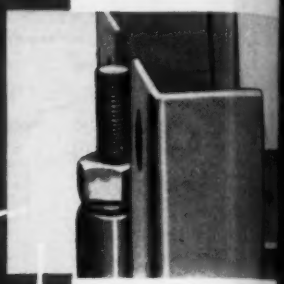
- Moloney Core has low exciting current.
- Low impedance coil improves voltage regulation.
- Sturdy frames assure a rugged, compact unit.
- Adjustable wood blocks retain the coils in position even under short circuit conditions.

Specify the distribution transformers designed, built, and tested for superior performance. Specify Moloney Transformers . . . All Along The Line.

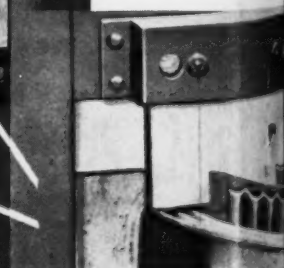




Moloney frames are of rugged steel design. They are made in two sections which are bolted together on both ends to allow adjustment for proper clamping of the coils.



Rugged adjustable wooden blocking, in conjuction with the framing structure, positions and retains the core and coil properly even under the distorting force of short circuit conditions.



MOLONEY ELECTRIC COMPANY

Transformers for Utilities, Industry and Electronic Applications

FACTORIES AT ST. LOUIS 20, MO., AND TORONTO, ONT., CAN.

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